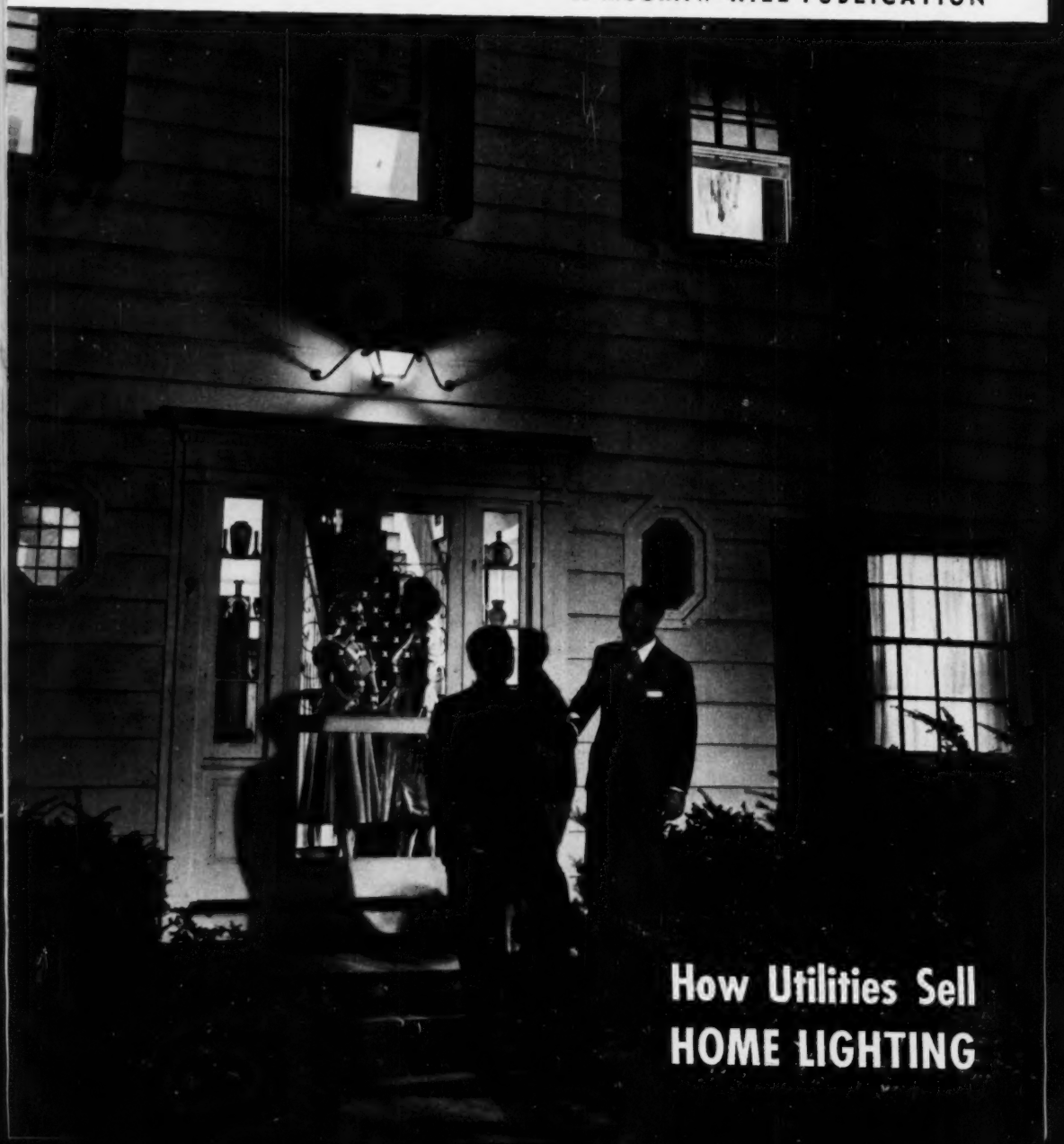
AUGUST 11, 1952

Electrical World

FOR THIS WEEK'S NEWS—SEE PAGE 103

Price 35 Cents

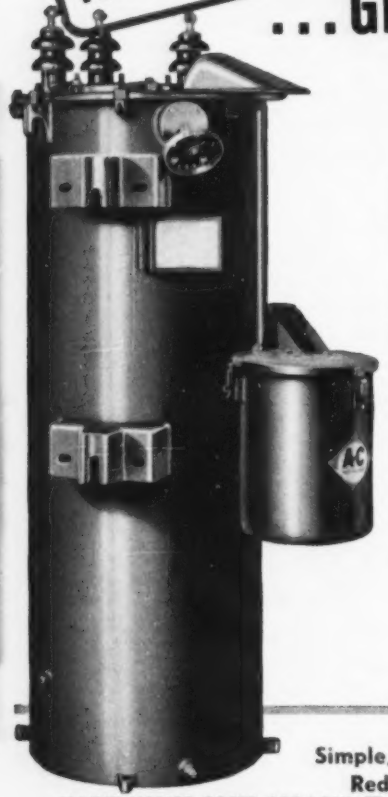
A McGRAW-HILL PUBLICATION



How Utilities Sell HOME LIGHTING

ALLIS-CHALMERS
5/8% Step
Voltage Regulators

...GET MORE PROFITS FROM ALL YOUR FEEDERS



You can make your feeders pay off in more profits easily: just add Allis-Chalmers distribution regulators to your lines. The cost is low. In fact, in many cases increased profits cover equipment costs in less than a year

Get A Narrow ± 1 Volt Band

Figure it out for yourself: you get a narrow ± 1 volt band with Allis-Chalmers distribution regulators. You get more revenue during peak loads. You don't waste kva during light loads.

Best of all, your customers are happier. Cooking is fast, lighting is right. It's easier to promote more consumer load — and more revenue — when voltage is properly regulated.

Get Years of Trouble-Free Service

And you get reliability with Allis-Chalmers distribution regulators. Eight years of field experience has proved that they give you trouble-free operation. Besides, Allis-Chalmers regulators are backed by 20 years of 5/8% step voltage regulator development.

Don't miss out on profits. Call your A-C district office today for the full story. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

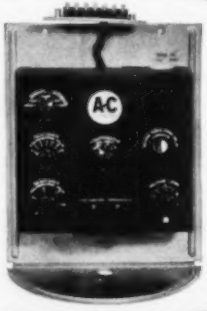
A-3835

RATINGS AVAILABLE	
	7620 VOLTS — 15-50-100 AMPS
	5000 VOLTS — 50-100 AMPS
	2500 VOLTS — 100-200 AMPS

Simple, Rugged Construction Reduces Operating Costs

MAINTENANCE COSTS ARE LOW. The simplified control shown at right is a good reason why it's so easy to install and maintain Allis-Chalmers distribution regulators. Setting the calibrated voltage level is easy and it's the only adjustment you make. Voltage band is pre-set at the factory.

The entire control can be removed and replaced easily. A single jack plug lets you disconnect all wiring fast. Complete information on the control of Allis-Chalmers distribution regulators is available in pamphlet form. It explains how you get accuracy, maximum accessibility and long life from this control. Write for the "Feather-Touch" control pamphlet, 01M7866-1.



Feather-Touch is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Originators of 5/8% Step Regulation

SO THAT ALL MAY READ

In some respects the most important page in this issue is Page 132. It is important because it attests the authority of the information given on the other pages in the section on Home Lighting Promotion. On this page are listed the 177 companies who supplied the information on which the section is based.

But there were others also who helped make this section a true cross section of industry practice. Among them were the Residential Lighting Committee of Edison Electric Institute, the Better Light-Better Sight Bureau, and the officers of associations in the lighting industry whose signed letters appear in the section.

Through the cooperation of these companies and executives Electrical World has been able to do a better job for its readers—a job from which we hope the industry will profit.

SO THAT ALL MAY WRITE

In this issue the "Letters to the Editor" department no longer appears on the last page. Instead you will find it on Page 187. The former location limited the department to three columns. The new location will allow the use of additional columns whenever necessary.

More and more readers have been writing to the editor. When letters contain information of value or constructive criticism of this magazine, we believe that they should be published. In this way we provide an additional service to the industry.

All readers are invited to submit letters for publication. Names will be withheld on request.

THAT GROWING FARM MARKET

The National Electrical Manufacturers Association has made a survey of the Midwest farm electric market (See p 164). And the amount of electrical home and farm production equipment the farmers intend to buy simply astounds city dwellers. This survey should be good news for appliance and farm equipment manufacturers. But it should be even better news for utilities serving the farmers. When all those appliances and pieces of equipment start drawing energy, load and sales should both soar. And income and profits should rise with them.

Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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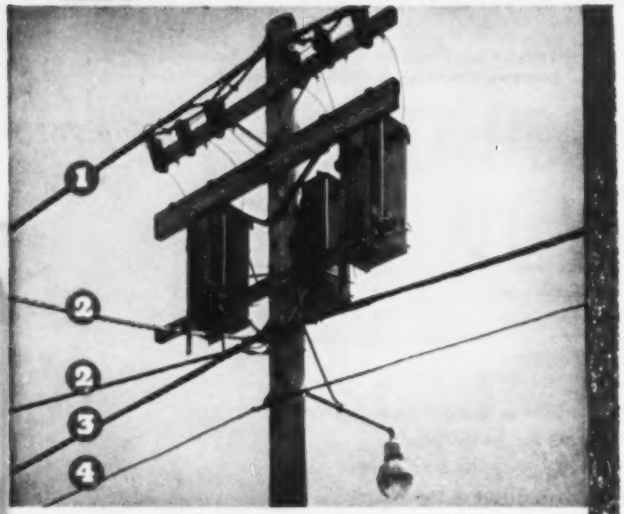
4 applications for OKOLITE-OKOPRENE *aerial cables*

. . . with these 16 advantages



1—PRIMARIES 2—SERVICES 3—SECONDARIES 4—LIGHTING CIRCUITS—all on one pole at Bonneville, Oregon.

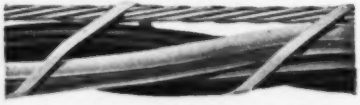
• Most utility engineers now recognize the advantages of aerial cables for primary circuits. Moreover, many are now using this economical cable design for street lighting circuits, for secondaries — including networks — as well as for service drops. For such installations, time-proved Okolite-Okoprene aerial cables — whether self-supporting, ring-supported or spinner-lashed — offer many advantages.

The patented Dualay* assembly, originally designed by Okonite engineers for hot-tapping of Okolite-Okoprene self-supporting primary cables, is also of distinct value for secondary circuits, since services can be taken off at any point, even in mid-span, without racks or spreaders.

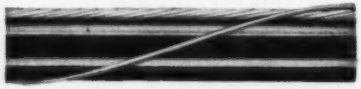
In addition to their suitability for utility overhead systems, Okolite-Okoprene aerial cables are extensively used by industrial plants and railroads for power, lighting, communication and control systems. Details on the many types available, with complete data on selection and installation, are available in Bulletin EW-1033. The Okonite Company, Passaic, N. J.

*In the Dualay method (U.S. Pat. 2,430,378) the insulated conductors are twisted together so that the direction of lay is reversed at regular short intervals to permit conductor separation without cutting the copper or performing any operation on the messenger.

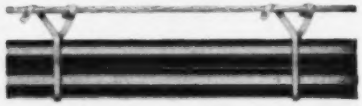
- **Improved circuit regulation and lower voltage drop through lower reactance.**
- **Tree trimming reduced or eliminated.**
- **Overlength poles not needed to clear treetops.**
- **Fewer service interruptions or outages.**
- **Reasonable original cost.**
- **Lower maintenance cost.**
- **Simple to install.**
- **Higher safety factor for linemen, people and property.**
- **Good appearance.**
- **No festooning.**
- **Long spans.**
- **Less congestion on poles.**
- **Elimination of cross-arms.**
- **Reduced clearance space near buildings and other structures.**
- **Greater reliability in storms—resist wind, icing, moisture—operate even if poles are down.**
- **Messenger serves as neutral.**



Okolite-Okoprene *Self-Supporting* Aerial Cable with in-built messenger. Made with Dualay* design for easy tapping.



Okolite-Okoprene cables can be lashed to messenger by the *spinner method.*



Okolite-Okoprene cables may be installed in regular *messenger rings.*

OKONITE SINCE 1878 *insulated wires and cables*

7980

Electroline Duct Rodding

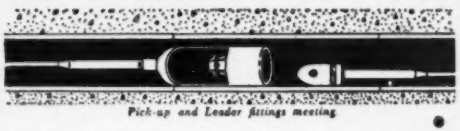
DOES IN THIRTY MINUTES WHAT USED TO TAKE TWO WEEKS

Utilities have found that one gang, with Electroline Steel Duct-Rodding Equipment, can make a half-hour job out of one that formerly took two gangs two weeks with old-style equipment!

In consequence, they have made amazing savings in labor cost alone. Add to this lower first cost, the lower handling cost, and longer life . . . then you have their reason for adopting Electroline's speedy, economical Duct-Rodding Equipment.

The construction is simple and trouble-free, yet affords the outstanding advantages of easy, efficient rodding and great durability in service.

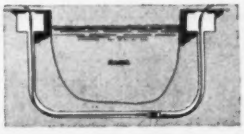
Originated by Electroline—Always Ahead of the Field. Write for bulletins.



Pick-up and Leader fittings meeting

Right, Electroline Steel Rodding Equipment feeds easily around the bends.

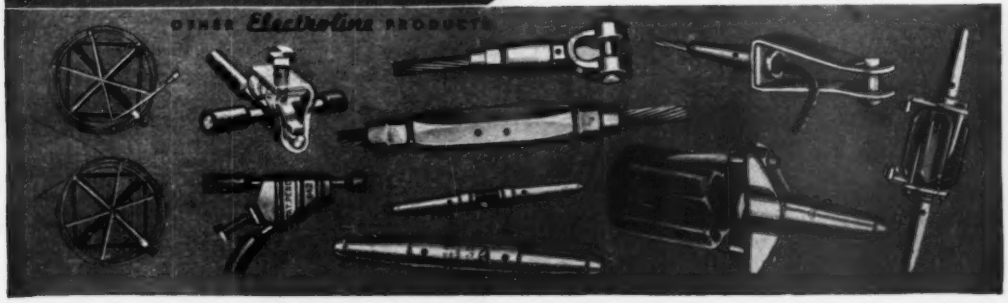
Below, Leader locked in Pick-up for either push or pull.



PATENT APPLIED FOR

Electroline Company

4121 South La Salle Street
Chicago 9, Illinois



NEW LOW COST

BREAKS ANY CHARGING CURRENT AND

THE TIME-TESTED ALDUTI INTERRUPTER SWITCH AT CONVENTIONAL AIR BREAK SWITCH PRICES

Since 1939 the reliability of the solid-material confined-arc extinction method of high voltage circuit interruption illustrated below has been proved under actual service conditions in thousands of installations for switching full rated load currents, line- and cable-charging currents, and magnetizing currents.

This circuit interrupting principle is now available in group-operated arrangements for pole-top switching at prices that compare with horn gap switches.

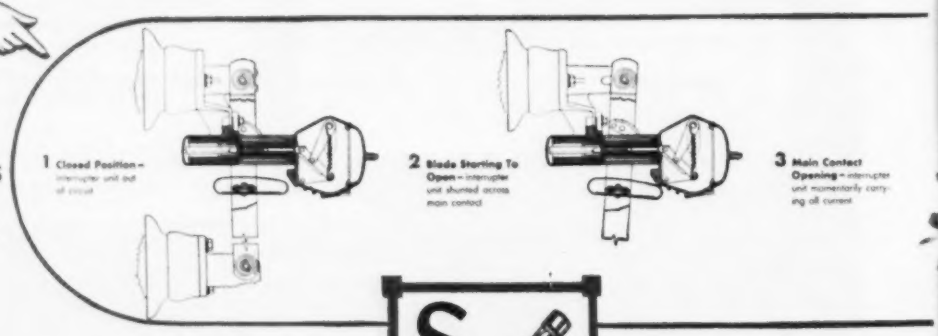
Because there is no external arc, this interrupter switch can be inverted, or mounted vertically, for simple installation and maintenance.

Further, because there is no external arc, the cost-saving side-opening design pictured here actually requires less phase spacing than a horn gap switch.

• • •

Full details are available from your local S&C representative, or the factory.

HERE'S HOW THE ALDUTI INTERRUPTER UNIT OPERATES TO PROVIDE CONFINED-ARC SWITCHING



S&C ELECTRIC

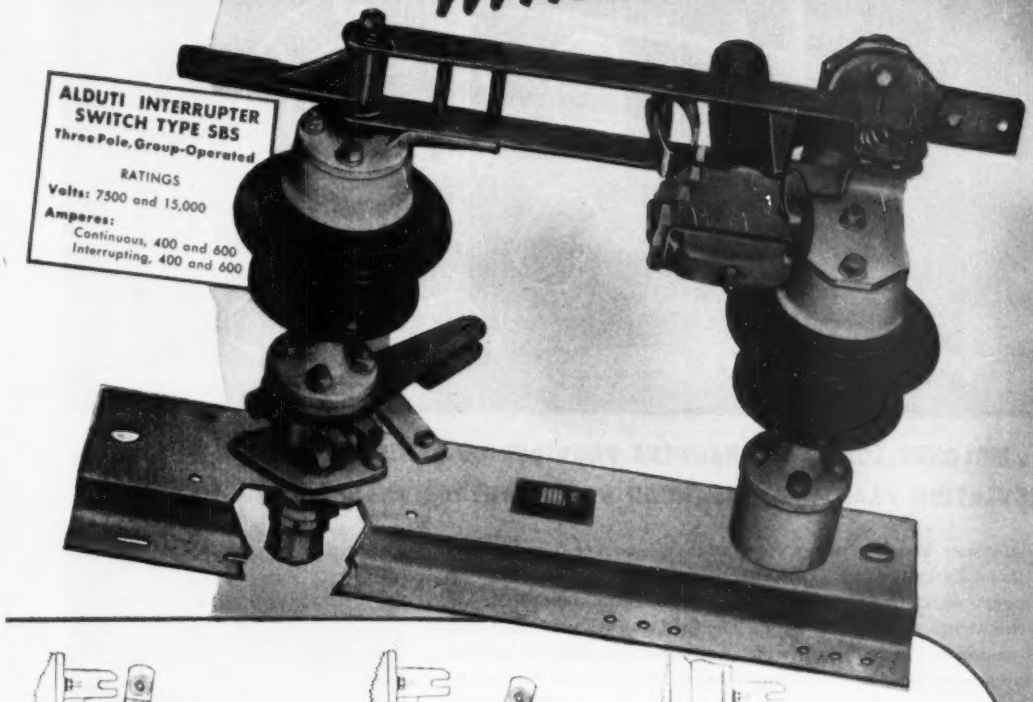
Formerly SCHWEITZER & CONRAD, INC.

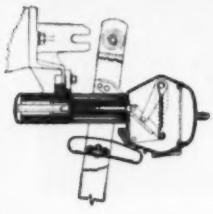
POLE TOP SWITCH

FULL LOAD CURRENT *WITHOUT ARCING!*

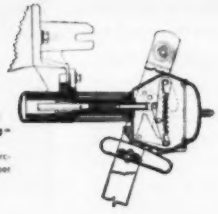
ALDUTI INTERRUPTER SWITCH TYPE SBS
Three Pole, Group-Operated

RATINGS
Volts: 7500 and 15,000
Amperes:
Continuous, 400 and 600
Interrupting, 400 and 600

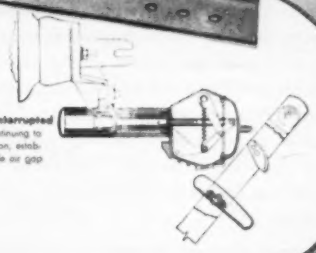




4 Interrupter Unit Contacts Parting – current being interrupted within arc-extinguishing chamber



5 Current Interrupted – blade continuing to open position, establishing visible air gap



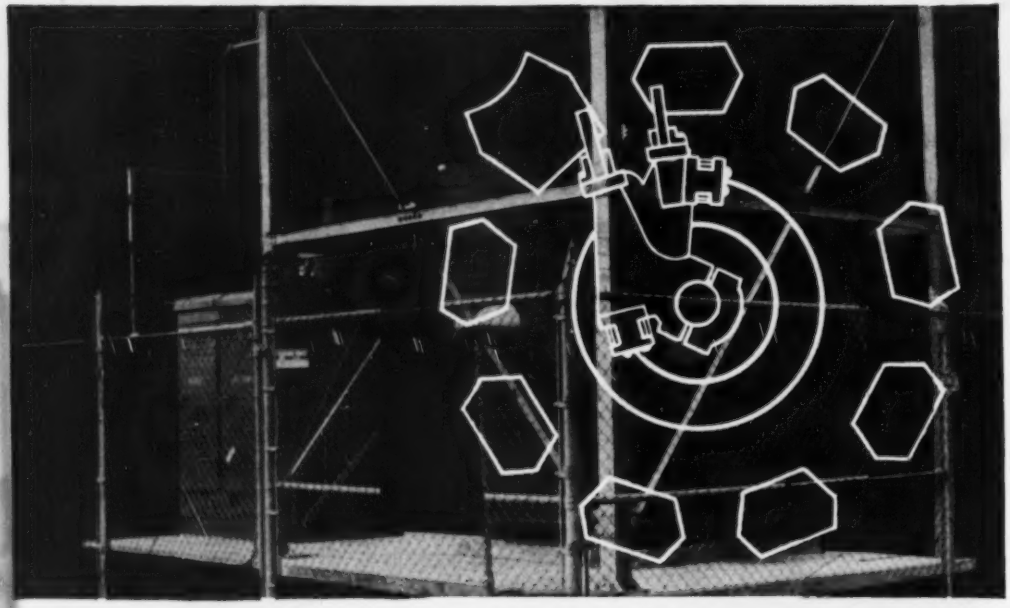
COMPANY

4421 Ravenswood Avenue
Chicago 40, Illinois, U. S. A.

In Canada, Powerlite Devices, Limited, Toronto

ELIMINATE ALL ARCING

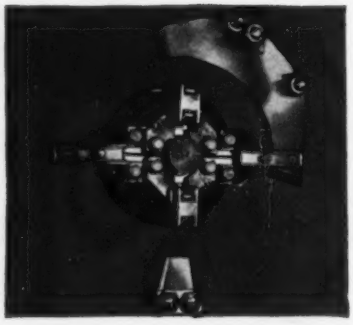
ON TAP SELECTOR SWITCH CONTACTS WITH . . .



. . . MOLONEY LOAD TAP CHANGERS PROVIDED ON FEEDER VOLTAGE REGULATORS, REGULATING TRANSFORMERS, LOAD RATIO CONTROL TRANSFORMERS

All Moloney Feeder Voltage Regulators, Regulating Transformers and Load Ratio Control Transformers are provided with Load Tap Changers which feature a load transfer switch to relieve the tap selector switch of all arcing duties. The load transfer switch has only four stationary contact tips per phase as compared with eighteen on the tap selector switch. This arrangement not only reduces the number of contacts subject to arc erosion, but also permits longer arc clearances to assure positive break of the arc. Liberal clearances of current carrying parts result in maximum capacity of the regulating equipment with minimum physical size. The load transfer switch, which is the only switch required to transfer load current, is provided with accelerating springs and is driven by Geneva gears. This assures quick break of the arc.

This is but one of the many features of the Moloney Load Tap Changer. This same sound basic construction is found in the regulating apparatus on which the tap changer is used.



Liberal clearances prevent establishment of an arc between adjacent current carrying contacts of the load transfer switch. Special alloy arcing tips prevent damage to the switch contacts as they are opened or closed.

MEB1-10

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

FOR Greater Dollar Value LOOK TO ANHYDROPRENE CABLES

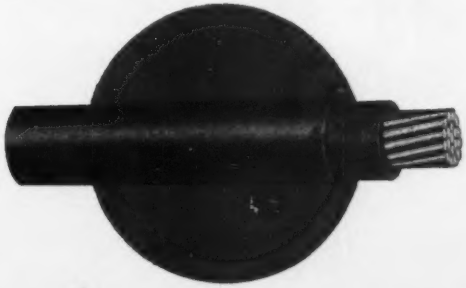
Do the high costs of materials and labor that exist today make you hesitant about buying the power cables you need? Then why not learn now how Anhydroprene cables can increase the value of each dollar you spend.

The simple 1-2-3 Anhydroprene construction consists of copper conductors insulated with the famous Simplex-Anhydrex compound, and a protective jacket of Neoprene. This Anhydrex-Neoprene combination assures long life with trouble-free service — the thrifty solution to problems of installation where ordinary cables now demand important dollars for repairs and eventual replacement.

Anhydroprene cables may be used for signal, control or power circuits. They may be installed underground in ducts. Within buildings they may be installed in conduits or raceways, or racked on walls.

Get acquainted with Anhydroprene today and you will realize greater savings from your future cable investments.

Write for Bulletin No. 115, an informative bulletin describing Simplex-Anhydroprene Cables.



Simplex - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

Advantages like these help you
Speed Line Work!

For Construction or Maintenance . . . Only FWD . . . the true 4x4 has all these features

Proper Weight Distribution

Only a true 4x4 gives you up to 50% of the weight on the front wheels. This gives you the extra traction needed to speed utility line work.

Full Torque P. T. O. . . . .

Utilizes full engine power through all transmission speeds. Exclusive safety lock prevents truck drive while boring.

High-Climb Oil Sump

Keeps oil pump constantly submerged. An FWD exclusive that lets you bore holes, set poles on steepest grades.

Two-Speed Aux. Transmission

Doubles the number of transmission gear ratios. Provides low gear ratio for full power at extreme low speeds in tough, cross-country operations.

Fully Compensated Drive

Three free-acting differentials compensate for differences in travel of all four wheels. Reduces drive line strains, eliminates needless tire scuffing.

Over 78 Matched Combinations of Trucks and Equipment

Now choose the exact mobilized tool that meets your requirements . . . and deal with only one source for complete service and supply.

DESIGNED WITH THE HELP OF VETERAN UTILITY MEN . . . FWD line construction and maintenance units handle your work . . . faster . . . safer . . . and at less cost. These mobilized tools get crews and equipment through to any location in spite of terrain or footing . . . speed work on the job . . . help maintain construction schedules or get service restored in a hurry. See your FWD dealer to get the facts on how FWDs can improve your service and earn more for each equipment dollar. The Four Wheel Drive Auto Co., Clintonville, Wisconsin. *Canadian factory*, Kitchener, Ontario.

Built by the makers of America's Foremost Heavy-Duty Trucks

THE ARRESTER WITH A *Heart* OF TRUE PROTECTION

Crystal Valve Element Guards Equipment, Service

Oxidized silicon carbide grain—heart of every Crystal Valve Lightning Arrester—is the exclusive secret of its dependable two-way protection.

At normal voltages, this amazing element has very high resistance. But under a lightning surge, resistance drops to a mere fraction of normal, returning high again when the surge is passed. Result—full protection for transformer insulation, plus no service blackout.

Non-deteriorating, this Crystal Valve element assures long-lasting, efficient, dependable protection. Its automatic adjustment to the severity of the discharge means minimum IR voltage drop and ample surge voltage reduction. You can rely on Crystal Valve Arresters—both ways!

Write Dept. 1709 today for latest data on lightning arresters. Ask for CV catalog. No obligation.

ELECTRIC SERVICE MANUFACTURING CO., PHILADELPHIA 32, PA.

CRYSTAL VALVE
LIGHTNING ARRESTERS

Good Engineering Counts

—ESPECIALLY WITH 3500 HP AT STAKE

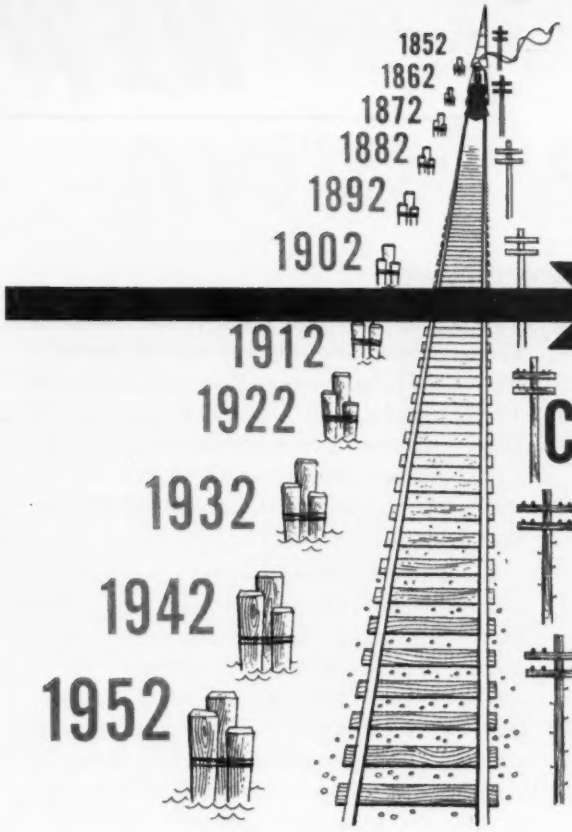
THESE 3500-HP, 3582-RPM MOTORS are driving boiler-feed pumps in a midwestern power plant. They were purchased only after a thorough check of Allis-Chalmers two-pole cage motor design details. And their operating reliability has proved that A-C engineering can meet the requirements of the largest boiler-feed pump drives in the power industry. A-3806

GET THE INSIDE STORY — For more information about large two-pole motors, ask your A-C representative for Bulletin 05B7550. Smaller cage motors are described in Bulletin 51B7693. Allis-Chalmers, Milwaukee 1, Wis.

Here are Some of the Features

- Separate steel balancing rings to provide dynamic balancing without weakening the end rings.
- *Dew-drop* bars that give better performance and stay tight in the rotor core slots.
- Forged end rings, drilled to receive the cage bars.
- Oxygen-free copper or deoxidized copper-base alloy bars and end rings to prevent embrittlement from silver-brazing.
- Air distribution arrangement that eliminates hot spots in both the stator and the rotor.
- Ring-oiling adequate for prolonged emergency operation without forced-feed oiling.
- Equalizing air pressure chambers in the bearing housings to positively keep oil out of the motor windings.

ALLIS-CHALMERS A-C



Of all
wood preservatives

only Coal-tar Creosote has stood the test of TIME

For more than 100 years, under the most severe and exacting conditions, Coal-tar Creosote—and ONLY Coal-tar Creosote—has been proved successful. In cold, hot, damp and dry climates . . . in salt water and fresh water . . . Coal-tar Creosote gives maximum wood protection at minimum cost.

Barrett*

Be sure it's **Barrett* Coal-tar Creosote**

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

*Reg. U. S. Pat. Off.

NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.

NEW

The Highgrove Steam Plant of the California Electric Power Company was recently placed in service at Highgrove near Riverside, California. The result of careful, long-range planning, this attractive, steam power station was ready for service just in time to meet a new peak load on the system; a peak greater than the highest wartime demand.

Highgrove is the only modern steam plant in a basically hydro system. It is a completely "outdoor" plant representing the very latest in engineering design. The Fluor Corporation of Los Angeles are the Consulting Engineers and Contractors. No effort has been spared to achieve maximum efficiency and reliability at minimum operating cost, for the Highgrove Plant is planned as a base load station for the system. When completed its ultimate capacity will exceed the total output of the Company's entire hydro production.

The first turbine-generator, recently in service, is of 30,000 kw capacity. It is anticipated that the second unit of the same capacity will be ready by September. Both units are served by C-E Steam Generators, Type VU-50, as illustrated and briefly described on the opposite page.

B-609

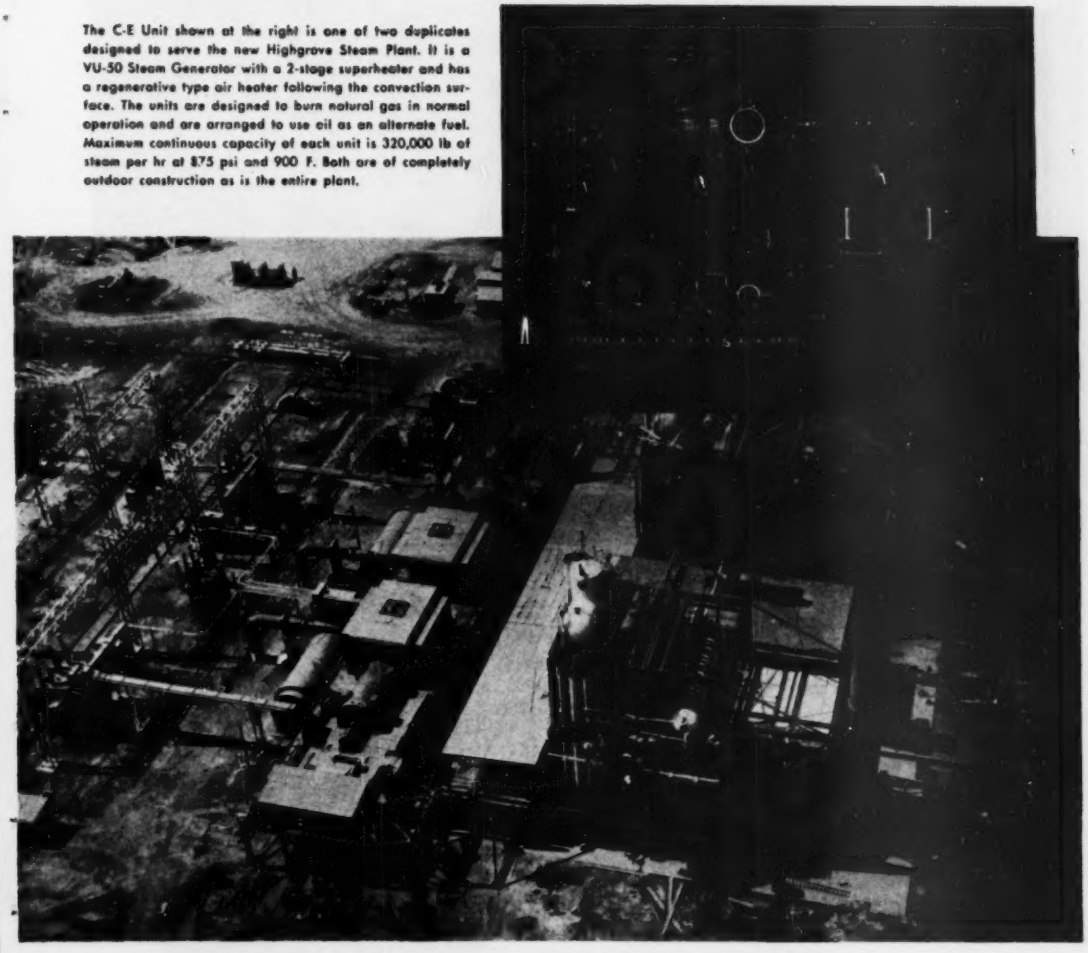
C-E

COMBUSTION

200 MADISON AVENUE, NEW YORK 16, N. Y.

Highgrove Steam Plant goes into service

The C-E Unit shown at the right is one of two duplicates designed to serve the new Highgrove Steam Plant. It is a VU-50 Steam Generator with a 2-stage superheater and has a regenerative type air heater following the convection surface. The units are designed to burn natural gas in normal operation and are arranged to use oil as an alternate fuel. Maximum continuous capacity of each unit is 320,000 lb of steam per hr at 875 psi and 900 F. Both are of completely outdoor construction as is the entire plant.



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ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

LARGE SOUTHEASTERN SYSTEM *reports:*

FROM ITS C-D CAPACITORS

Called upon to supply enormous quantities of power to vital government plants, this utility is extremely "power-factor conscious." To date, C-D capacitors have delivered over 500 million Kvar hours of trouble-free service for this utility, under the most severe operating conditions! This outstanding field performance record is typical of more than 4,000 C-D power-factor installations made in the past decade.

a real test for capacitor dependability!

C-D installation shown is at the Southern Ferro Alloys plant. The large open type furnace (in background) runs well over 3000° F. This, plus the summer sun, corrosive fumes, etc. is a most severe test of the capacitor installation's ruggedness.

A C-D engineer will be glad to point out the many dollar-saving characteristics of C-D capacitors

CORNELL-DUBILIER ELECTRIC CORP. DEPARTMENT D 83 A SOUTH PLAINFIELD, N. J.

CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

PLANTS IN: SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C. AND SUBSIDIARY: THE RADIANT CORP., CLEVELAND, OHIO

Perfect fit...

FOR THE PERFECT FIT in additional utility load *plus* that comfortable feeling that comes from high annual revenues and low service costs, why don't you look into commercial electric cooking promotion?

Here are just a few of the reasons commercial electric cooking will fit your utility's bill . . .

- . . . *Good Load Factor—averaging 30%!*
- . . . *High Diversity—seldom more than 40-50% of total connected load!*
- . . . *Good Voltage Regulation!*
- . . . *100% Power Factor!*

With an average return of 13% on each dollar invested, you'll find it's smart—and profitable, too—to get a line on this energy outlet now. Hotpoint has programs ready that can and will show you how to do it . . . quickly and easily!

Won't you write me a letter expressing your interest?

Just address it to: Orrin E. Wolf, Vice President, Hotpoint Co. —Commercial Equipment Department—265 So. Seeley Ave., Chicago 12, Illinois.

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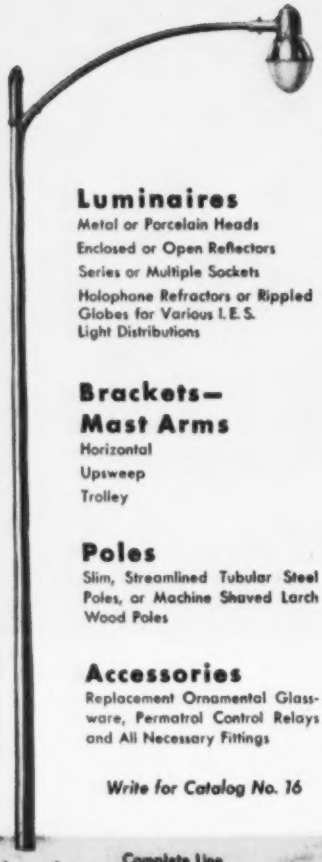

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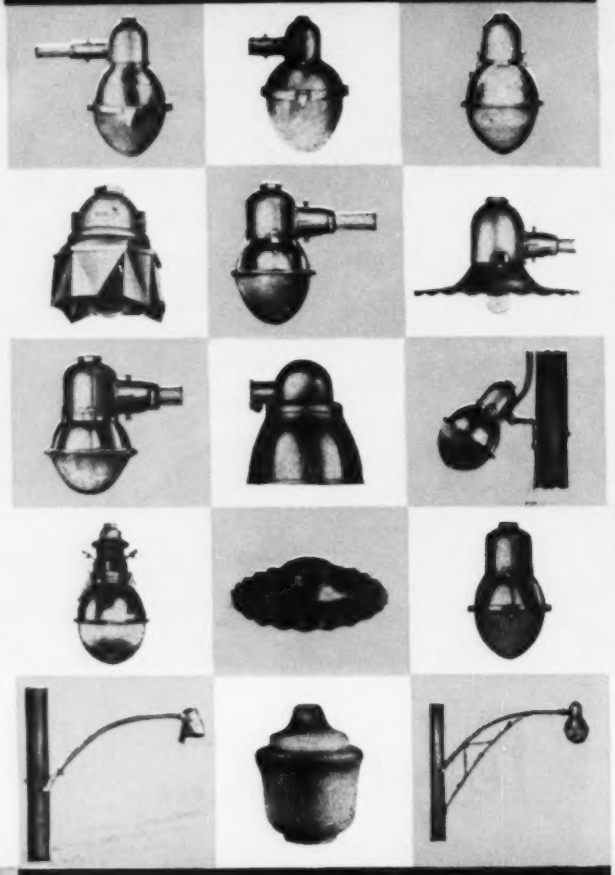
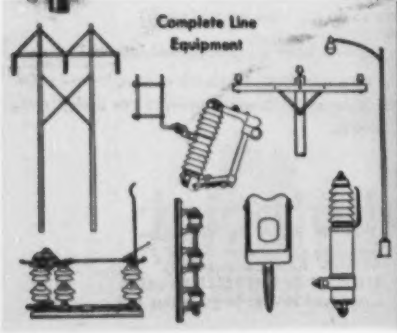
Write for Catalog No. 16





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NEW LOAD PICKUP SECTIONALIZER SOLVES PROBLEM OF RE-ENERGIZING HEAVILY LOADED FEEDERS

Continued load growth and increasing use of automatically controlled motor loads present serious problems of re-energizing feeders after extended outages. The new Westinghouse "LPS" (Load Pickup) Sectionalizer offers a permanent solution to this growing problem on radial distribution feeders.

Operation on Extended Outages

Loss of diversity, and inrush currents after extended outages operate the station breaker through its tripping sequence. The "LPS" counts the pulses of overload current created by the opening and closing of the breaker—it opens during the third open-circuit time, dropping its portion of the load. Control voltage (110 volts) from the line side of the "LPS" operates its relays to close the "LPS" after an adjustable time delay, picking up the remainder of the load.

Automatically picking up the distribution system in sections reduces the maximum inrush current, permitting low, and thus more sensitive relay settings.

Operation on Faults

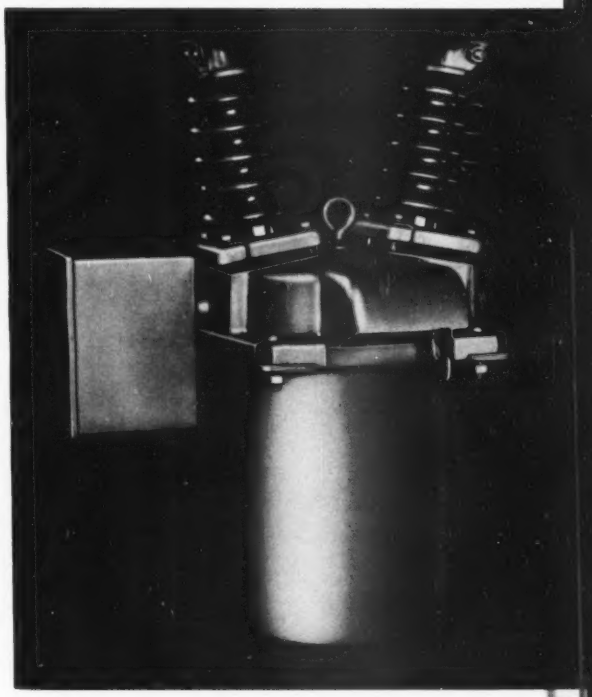
The "LPS" sectionalizer also has the desirable feature of being able to sectionalize the load it controls, should a permanent fault occur in that area. A fault at "X" operates the station breaker through its tripping sequence. The "LPS" counts the pulses of fault current and opens during the third open-circuit time, disconnecting the faulted portion of the system. The mechanical trip-free mechanism in the "LPS" prevents the control voltage from closing it on the fault until reset by the lineman.

A Versatile New Tool for Your Distribution System

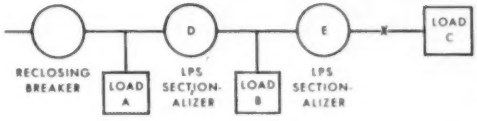
The "LPS" control relay has adjustable pickup times of two to thirty minutes. The fault counting sequence may be varied from one to three counts. Control voltages of 110, 220, and 460 volts are available.

Three "LPS" sectionalizers may be secured, mounted and wired on a channel for three-phase installations.

For complete information on the new Westinghouse "LPS" sectionalizer, write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pennsylvania.

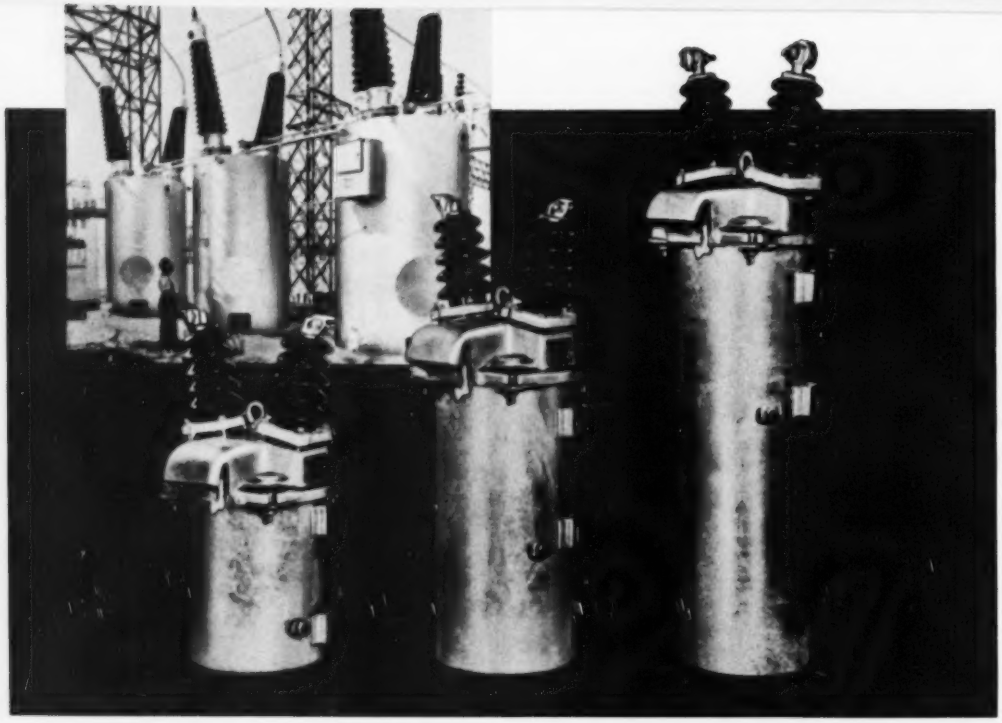


Type "LPS" Load Pickup Sectionalizer.



Typical application of "LPS" Load Pickup Sectionalizers. "LPS" at point E would be set to add Load C to system after Loads A and B have regained diversity.

YOU CAN BE SURE...IF IT'S
Westinghouse
DISTRIBUTION APPARATUS



GRS SECTIONALIZER—15 kv, 5 to 100 amperes, 6,500-ampere max. momentary rating.

50-GR RECLOSER—15 kv, 5 to 50 amperes, 1,200-ampere max. int. rating.

100-GR RECLOSER—15 kv, 25 to 100 amperes, 2,500-ampere max. int. rating.

"BIG BREAKER" ENGINEERING BACKS WESTINGHOUSE RECLOSER AND SECTIONALIZER DESIGNS

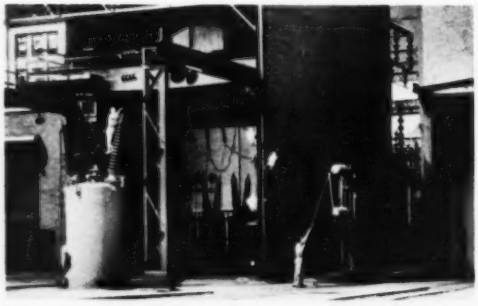
Westinghouse Reclosers and Sectionalizers are fundamentally small oil circuit breakers. Knowledge gained from years of experience in designing, building, and testing big breakers—with interrupting capacity of 10,000,000 kva and higher—has been applied to the development of Westinghouse Reclosers and Sectionalizers.

This knowledge covers the efficient interruption of fault current under oil—adequate internal insulation co-ordinated with bushing insulation—other important factors such as time sequence and surge protection.

High Power Laboratory Testing

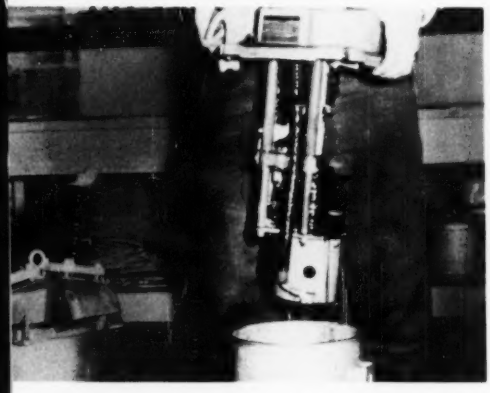
Complete testing of Reclosers and Sectionalizers is important just as it is in the case of large breakers. This testing is done in the Westinghouse High Power Laboratory under the same accurately controlled conditions.

Testing under the most severe conditions—with 15,000 volts across a single recloser—with maximum symmetrical rated current—at power factor of less than 7%—is one more reason why—you can be sure, if it's Westinghouse.

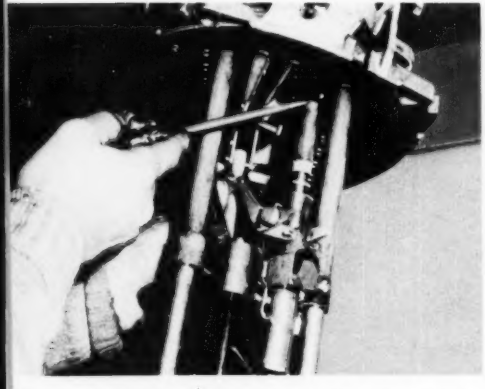


View of Westinghouse High Power Laboratory where Westinghouse Recloser and Sectionalizer designs are proved under accurately controlled conditions.

A single operation after lockout assures safety of operator. Operation is time-delay to ride through inrush currents.



Recloser is readily dismantled for inspection, change of current rating, or replacement of contacts.



A simple hydraulic timer determines tripping time, and assures positive lockout after the predetermined number of operations.

SAFE, STURDY, EASY-TO-MAINTAIN DESIGNS

Westinghouse Reclosers and Sectionalizers are the safest, most dependable devices available today. Safety is insured by a heavy drawn steel tank and cast-iron cover, both galvanized for long maintenance-free life. Safety of operating personnel is further assured through a design that allows only one operation to "lockout" when closed in on a fault. To assure picking up a line after lockout—this one operation is a "time delay" operation and will ride through and pick up inrush currents associated with a "cold line" without unnecessary openings.

Loosening four clamps which fasten the cover to the tank permits quick inspection of the contacts, tank liner, and oil. The contacts then may be replaced using only a pair of pliers. An inexpensive contact replacement kit makes this job doubly easy.

Wide Variety of Tripping Sequences Available

Tripping times are determined by a simple trouble-free hydraulic timer. A mechanical ratchet changes the operation from instantaneous to time delay and insures positive lockout after four operations under any condition of fault current or operating temperature. The simple mechanical ratchet permits selection of up to nine combinations of instantaneous and time delay openings.

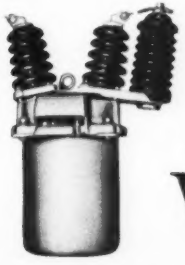
Temperature Compensation

Since the timer element is hydraulic, it is affected by oil temperature. Westinghouse Reclosers are available with temperature compensation for all locations where extremely low temperatures create fuse-recloser co-ordination problems.

Co-ordinated Lightning Protection

For completely self-protected reclosers—bushing-mounted expulsion arresters are available for mounting on any Westinghouse Recloser and Sectionalizer, as shown below.

For complete information, ask your nearby Westinghouse or Westinghouse distributor salesman for: DB 38-680—50-GR reclosers; B-4339—100-GR reclosers; DB 38-690—GRS Sectionalizers. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.



YOU CAN BE SURE...IF IT'S

Westinghouse

THE INDUSTRY'S MOST COMPLETE LINE OF CUTOUTS gives you unmatched versatility in line protection

Note how this line-up of Westinghouse Cutouts meets every requirement of versatile line protection. First—a choice of four basic housings (from front to rear): 50 ampere for 5000 and 7500-volt service, and 100 ampere for 5000 and 7500-volt service. Second—five individual doors, interchangeable in the same ampere rating housing (left to right): Standard-duty indicating, standard-duty non-indicating, heavy-duty indicating, heavy-duty non-indicating, and disconnect blade.

All doors fit perfectly into the housing because Prestite® porcelain, used exclusively by Westinghouse, provides a cutout offering exceptional dimensional fidelity. Positive dropout action gives a clear indication of a blown fuse. Hookstick operation permits safe, fast re-fusing. Cool operation assures long, trouble-free life. Westinghouse Cutouts have an enviable record of trouble-free service under severe temperature conditions.

For complete information on Westinghouse Cutouts ask for copies of Booklets DB 38-625 and DB 38-628. Contact your Westinghouse representative or Westinghouse distributor or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-60791

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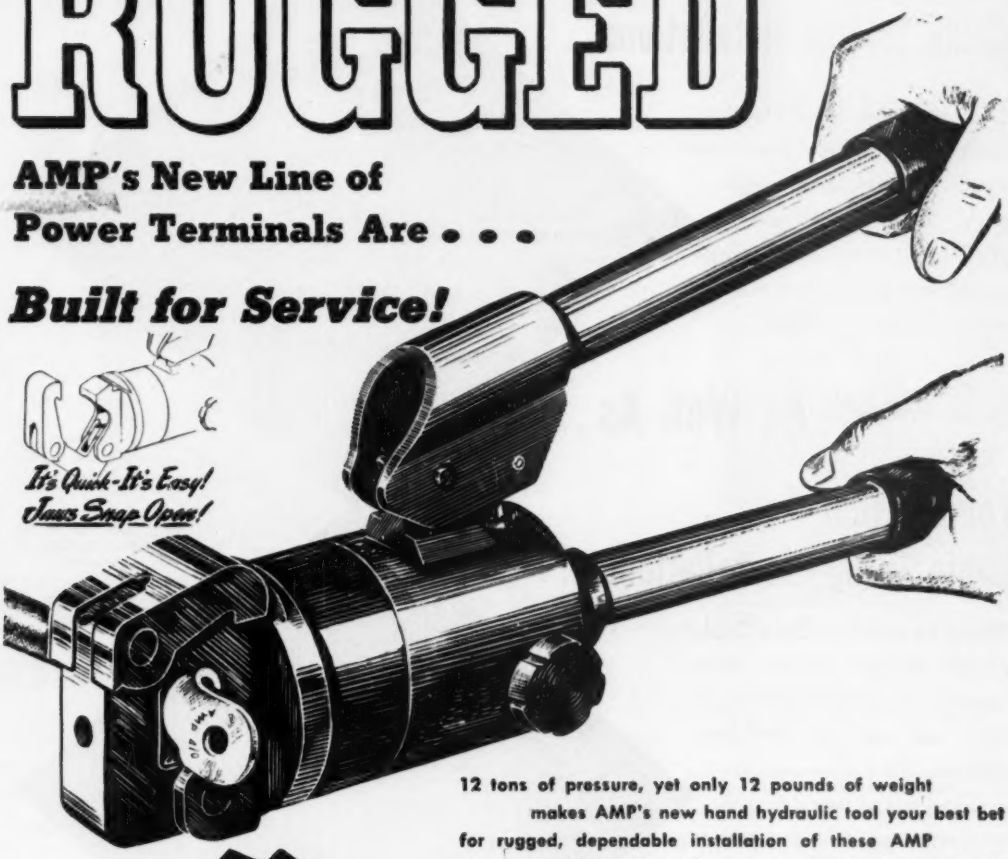
RUGGED

AMP's New Line of Power Terminals Are . . .

Built for Service!



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Jaws Snap Open!

AMP Trade-Mark
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12 tons of pressure, yet only 12 pounds of weight makes AMP's new hand hydraulic tool your best bet for rugged, dependable installation of these AMP *precision-engineered* power terminals. Terminals and connectors are available in all ranges from #8 to #4/0. DESIGNED FOR USE ON ALL SHAPES OF WIRE: SOLID, STRANDED, SQUARE, OVAL, OR COMBINATIONS! Dies snap in and out easily. Tool automatically releases when crimping pressure is reached. Can be used with either pole strap or bench stand if desired. WRITE FOR SPECIAL POWER TERMINAL CATALOG.

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AIRCRAFT-MARINE PRODUCTS INC.
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For Most Cable Trough Installations . . .

Our exhaustive list of standard COPE Cable Trough parts can easily be worked into your plans. The simplified design of standard COPE Cable Trough actually saves you three ways — materials, labor and costs.

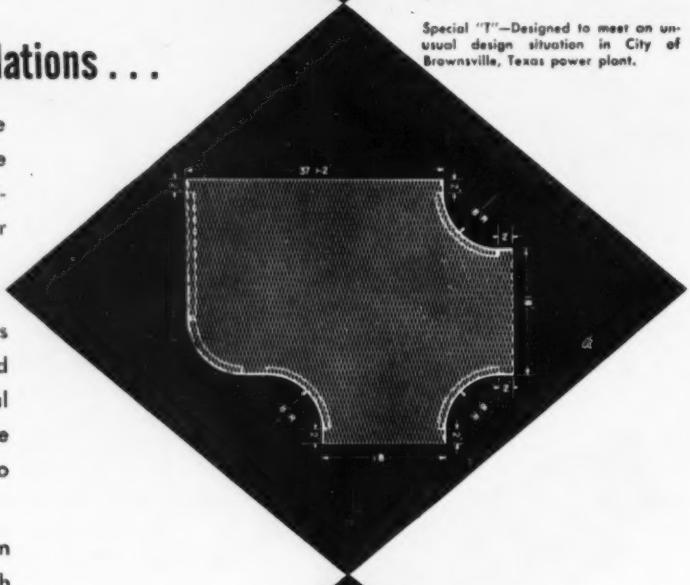
Standard Installation of COPE Trough at Danskammer Point Steam Station, Central Hudson Gas & Electric Corporation.

As Well As...

For Unusual Cable Trough Installations . . .

Where the standard COPE Cable Trough cannot answer those "special situations," COPE Engineers will help you with your problem. We will, as we have for hundreds of users, furnish special fittings. All we require is an outline of your problem and we will then design any special fittings necessary to adapt the standard COPE Cable Trough to your specific job.

Please request full information on standard COPE Cable Trough from us today.



Special "T"—Designed to meet an unusual design situation in City of Brownsville, Texas power plant.

T. J. COPE, INC., 711 SOUTH 50th ST.
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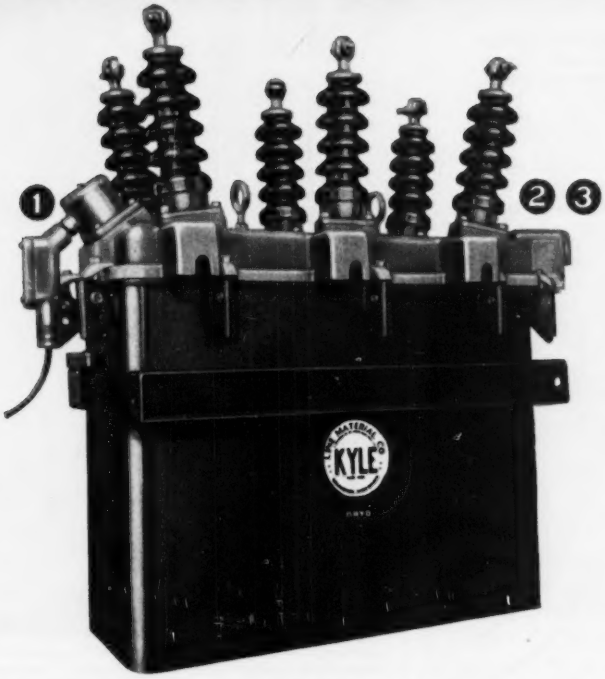
T. J. Cope INC.

You know Cope by these products



L-M's Kyle Type 3H Recloser Provides Automatic 3-Phase Protection

With three units in one tank, linkage tolerances can be controlled more closely, insuring more accurate and dependable 3-phase operation of the recloser.

The Kyle Type 3H 3-phase recloser provides individual reclosing and resetting on each phase for temporary faults. In case of permanent fault on any one phase, the recloser locks out *all three phases simultaneously.*

The Kyle 3H Recloser can be coordinated with sectionalizers or branch line fuses to isolate permanent faults to small sections of the system. Because all three units are in one tank, there is no external linkage; and greater operating accuracy and dependability are assured.

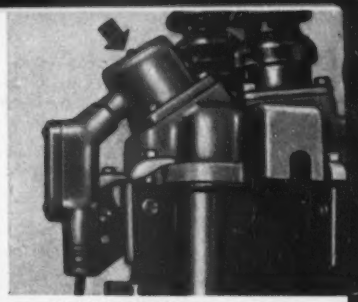
Positive toggle action; fast opening and closing do not depend on gravity. The Kyle hydraulic mechanism has proved itself over years of service to be dependable and trouble free.

The Kyle 3H can be applied on systems up to 15 kv, with nominal load ratings from 5 to 50 amperes and minimum trip currents from 10 to 100 amperes. Coils are easily changed right in the field. Interrupting ratings from 150 to 1200 amperes. Trip-free operating handle and all other Kyle safety features. Plated Universal bushing terminals for copper or aluminum. Available with the accessories shown at the right.

Get the Whole Story of Automatic Protection

Ask the L-M Field Engineer for a copy of Bulletin CR-1, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

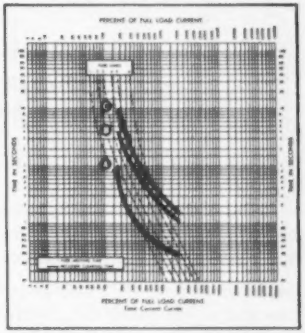
Like all Kyle reclosers, the Type 3H is filled with ORTO®, L-M's oxidation-resistant transformer oil.



1 SHUNT TRIP COIL: an optional accessory that permits tripping the recloser from a distant point so it will not reclose. Or for ground fault-tripping with relay or other control equipment, the coil locks out the recloser in one fast operation. Must be built in at the factory.

2 KYLE NON-RECLOSING FEATURE: when control lever is down, this accessory prevents automatic reclosing, providing fast lockout on the first operation, for greater safety for men and equipment during hot line work. Available on all Kyle reclosers.

3 AUXILIARY SWITCH: an SPDT switch that may be attached to a Kyle 3H recloser. It may be used either to operate a remote indicator light to show when the recloser is open and closed; or as a limit switch to cut off current from the shunt trip coil after it has operated.



Kyle Reclosers offer the widest choice of time-current curves and sequences. You can select from Curve A, fast; B, retarded; C, extra-retarded. Choice of seven sequence combinations; sequences quickly changed right in the field.

LINE MATERIAL
Kyle® Reclosers

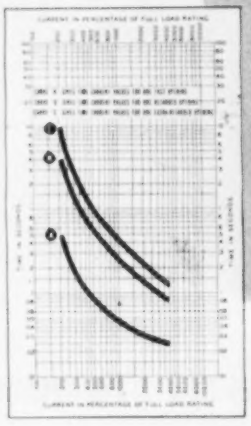
97

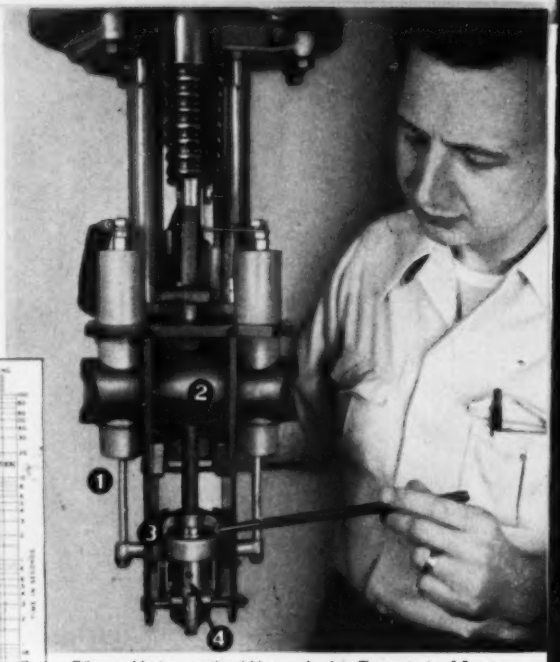
L-M's Kyle Type E 23 kv recloser outranks all others in its class for dependability, long service, low maintenance, and interrupting capacities. New higher interrupting capacity and 150 kv BIL assure ample safety factor.

"Universal" terminals for copper or aluminum conductor
Oil-filled clamp-on bushings — extremely low radio noise level
Heavy aluminum cover with operating handle, operations counter, and optional Kyle non-reclosing device lever under sleet hood
Heavy tank with welded bottom for better support, better protection
KYLE

CHOICE OF SEVEN SEQUENCES

Only Kyle reclosers offer choice of three time-current curves and seven standard operating sequences. Curve A, fast; curve B, retarded; curve C, extra-retarded. Permits close coordination with fuses and other reclosers in series.





Oil cross blast arc extinguishing mechanism. The contacts of finest arc-resisting material (1) draw two arcs in series. Gas formed by one arc blasts the oil in the cross-blast chamber (2) across the other arc, extinguishing it instantly. The engineer points to the contact buffer mechanism (3), which permits varying contact opening speed by means of a removable plug (4). This insures best interrupting performance at both 23kv and up to 14.4 kv.

L-M's KYLE Type E 23 kv Recloser Now Interrupts up to 1750 Amperes at 23 kv

To meet heavier load requirements, interrupting capacities are increased to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv. Provides full 150 kv BIL insulation, giving greater insulation safety factor with longer life. For all distribution voltages from 2.4 to 23 kv.

The heavy insulation and the improved oil cross blast method of arc extinction make the Type E an outstanding recloser for high voltage application, and provide an intermediate duty recloser up to 14.4 kv.

Oil-filled clamp-on bushings provide radio noise level well below NEMA standards. Plated Universal terminals for either copper or aluminum conductor. The recloser is available with a choice of eight coil ratings, three time-current curves, and seven tripping sequences. Coils and sequences are easily changed *in the field.*

Like all Kyle reclosers, the Type E is filled with ORTO®, L-M's oxidation-resistant transformer oil.

Get details on this exceptional recloser, which has proved so successful in service. Ask the L-M Field Engineer for copy of bulletin on the Kyle Type E, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company division).

Type E Single Phase
Nominal Rating 23 kv, BIL 150 kv

Rating Amperes	Minimum Tripping Current Ampere	Interrupting Ratings* Symmetrical RMS Amperes at Maximum Phase to Phase Nominal Voltage of: 14.4 kv	23 kv
5	10	200	125
10	20	400	250
15	30	600	375
25	50	1000	625
35	70	1400	875
50	100	2000	1250
70	140	2500	1750
100	200	2500	1750

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

LINE MATERIAL
Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

96

Interrupting ratings now up to 6000 amperes at 4.8 kv, 4000 amperes at 14.4.

Complete range of nominal load ratings from 25 to 200 amperes, for 2.4 to 14.4 kv service, makes available the greatest number of sectionalizing points in this class.

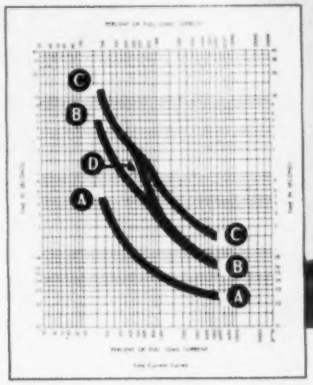
Only Recloser with:

Choice of four time-current curves, ten tripping sequences, which gives maximum flexibility in meeting all coordination problems on heavily loaded distribution circuits.

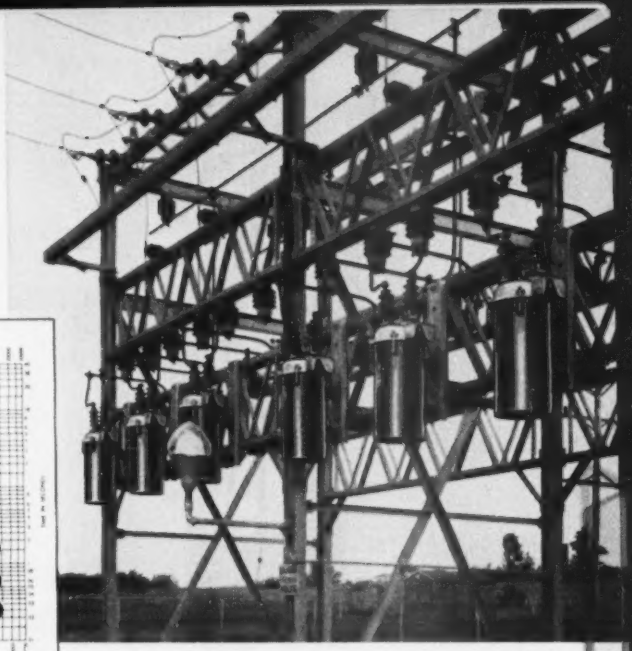
Full power-class design, with 110 kv basic insulation level.

Clamp-on bushings, with plated Universal terminals for copper or aluminum conductor.

Oil Cross Blast arc interruption insures rapid clearing of heavy faults.



Only recloser with choice of 4 time-current curves and 10 operating sequences. Coils and sequences are easily changed in the field.



Kyle Type L Reclosers at a middle-western power company substation, where they help assure uninterrupted service to an urban area.

L-M Increases Interrupting Rating, Adds 200-amp Rating to Kyle Type L Recloser

To protect substations and feeders with heavier loads and higher fault currents, L-M has added a 200-ampere rating to the Kyle Type L Recloser, and has increased interrupting ratings appreciably.

The higher interrupting ratings are based on extensive testing of production reclosers, as well as field experience, and apply to Kyle Type L Reclosers already delivered.

The new higher nominal load rating involves a new coil and some increase in the capacity of certain current carrying parts. The changes can easily be made on any Type L reclosers now in service if desired.

The Kyle Type L not only handles present heavy loads, but it offers increased capacity for the future, plus the present benefits of Type L performance and economy. It provides complete coordination with fuses and other reclosers in series, with a corresponding reduction in fuse blowing and service calls.

Heavy Duty
Type L Single Phase
Nominal Rating 14.4 kv, BIL 110 kv

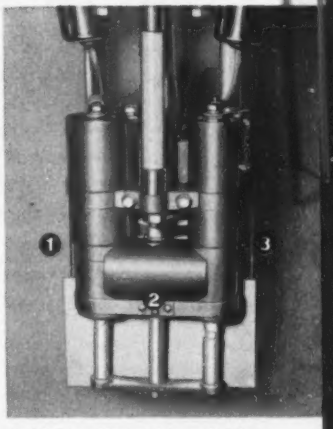
Rating Amperes	Minimum Tripping Current Amperes	Interrupting Ratings* Symmetrical RMS Amperes at Maximum Phase to Phase Nominal Voltage of: 4.8 kv	14.4 kv
25	50	1500	1500
35	70	2100	2100
50	100	3000	3000
70	140	4200	4000
100	200	6000	4000
140	280	6000	4000
200	400	6000	4000

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

Get the Details

Ask the L-M Field Engineer for full information on the Type L and other Kyle Reclosers providing complete, coordinated protection; or write for a copy of bulletin CR-1A. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Kyle Reclosers are filled with ORTO®, L-M's oxidation-resistant transformer oil.



Rapid oil cross blast arc interruption. Double contacts draw two arcs in series. Gas from one arc at 1 blasts oil in chamber, 2, across arc at 3, extinguishing it.

LINE MATERIAL
Kyle® Reclosers

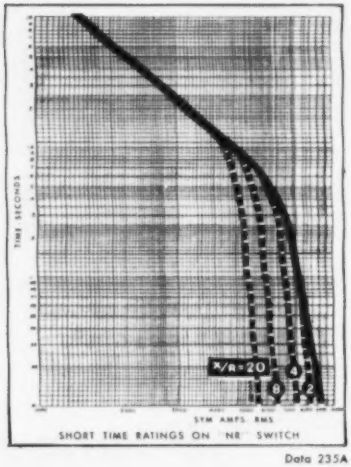
COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD

99

L-M's Kyle Type "NR" remote control oil switch—the same switch used in L-M's switched capacitor racks.

"Field-Designed"—with the features users asked for.

200-amperes nominal load rating at 14.4 kv, 150 amperes for capacitor switching. 9000 amperes RMS asymmetrical momentary current rating.



Data 235A

L-M Announces New Remote Control Oil Switch for Capacitor Switching

Here is L-M's new motor-operated 200-ampere remote control oil switch. It is specially designed for low-cost capacitor switching up to 3500 kvar 3-phase, but is equally suitable for street lighting, flood and airport lighting, protective lighting, sectionalizing, and other remote control switching applications. Ratings meet users' needs and requirements for capacitor switching and many other applications.

The contact structure is so designed that heavy currents increase contact pressure and give the switch high momentary and short-time current ratings. Spring-loaded contacts give very fast "make" and "break"—which eliminates restrikes and minimizes contact erosion when closing in on large capacitor banks.

The switch can be bolted directly to the pole, or crossarm with a thru-bolt or crossarm-mounted with a clamp-around hanger. Clips also available for mounting on substation steel structure.

Control motor requires less than one ampere at 120 volts, which permits the lightest wiring, simpler control circuit, and gives longer life for limit switches and relays.

Get Full Information

Ask the L-M Field Engineer for details on this new Type NR Switch—or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

Type "NR" Switch Ratings

SINGLE PHASE

VOLTAGE

Nominal	RMS 14.4 kv
Maximum design	RMS 15.0 kv
60 cycle, one minute withstand, dry	RMS 35.0 kv
60 cycle, ten-second withstand, wet	RMS 30.0 kv
1½ x 40 Ms impulse withstand, crest, BIL	95.0 kv

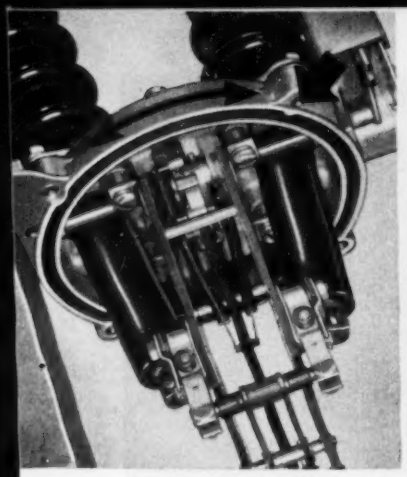
CURRENT

Thermal	200 amperes
Capacitor switching, nominal	150 amperes
Inductive load switching,	
75 to 100% PF	200 amperes
30 to 75% PF	100 amperes
Less than 50% PF	50 amperes
Momentary, RMS Asymmetrical	9000 amperes
Short-time, RMS Symmetrical	
10 seconds	1400 amperes
1 second	4500 amperes

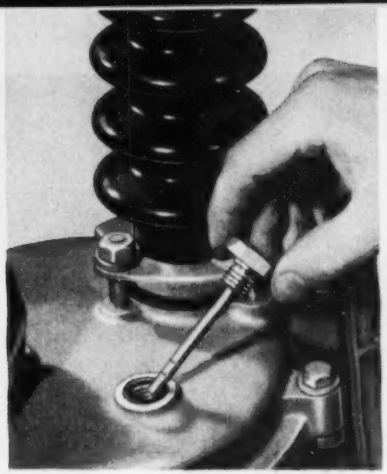
For larger ratings at shorter time intervals see curve, Data 235-A above.

CONTROL

Motor-operated actuator requires less than one ampere at 120 volts. Permits simplest control circuit and gives long life of limit switches and control relays.

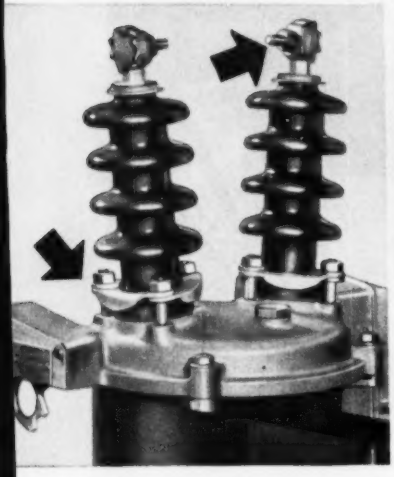


Head may be rotated and set at desired position. Lips in the groove on the underside of head hold the gasket so that it doesn't fall out when the cover is lifted.

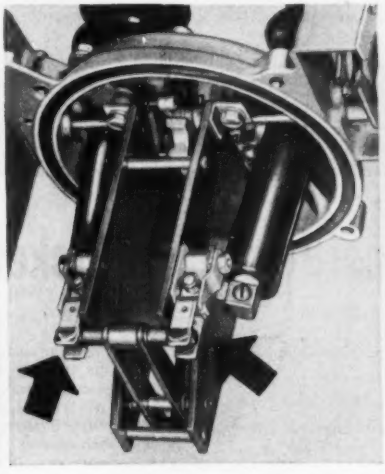


Oil dip stick on the head for checking the oil level. The tank holds 1½ gallons of oil. The inner mechanism is insulated from the tank by the oil and by a tank liner.

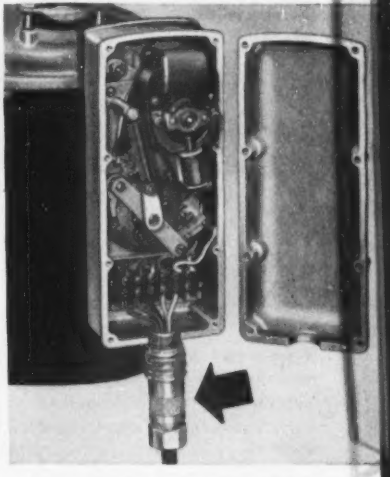
Heavy bracket for direct mounting to pole or crossarm with or without a hanger. Heavy tank, with inserted concave bottom, so that only the rim takes abrasion.



The bushings are the clamp-on type which make replacement easy. Bushings are oil-filled for lowest radio noise level. Plated Universal terminals for aluminum or copper conductor, No. 8 to 2/0.



Contacts arranged so heavy currents increase contact pressure, giving high momentary and short time current ratings. Spring-loaded contacts give quick make and break to prevent restrikes and minimize erosion.



Motor-operated actuator requires less than one ampere at 120 volts, permitting lighter wiring and simplest control circuit, and assuring long life for limit switches and relays. Weatherproof plug-in connection at bottom of box and weatherproof plug available.

CAPACITOR SWITCHING RATING

Voltage	Based on 25 KVAR Units				Based on 15 KVAR Units			
	Three-Phase		Single-Phase		Three-Phase		Single-Phase	
	Bank Size KVAR	No. of Units	Bank Size KVAR	No. of Units	Bank Size KVAR	No. of Units	Bank Size KVAR	No. of Units
2400	600	24	350	14	585	39	360	24
4160	1050	42	625	25	1080	72	615	41
4800	1200	48	725	29	1215	81	720	48
7200	1800	72	1075	43	1845	123	1080	72
12470	3225	129	1850	74	3240	216	1860	124
13200	3375	135	1975	79	3420	228	1980	132
13800	3525	141	2050	82	3555	237	2070	138

LINE MATERIAL

Kyle® Oil Switches

Like all Kyle reclosers, the Type NR switch is filled with ORTO®, L-M's oxidation-resistant transformer oil, inhibited for longer life.

From time card to travel ticket

Every angle completely covered . . . but one! When fire strikes during the night your skilled labor may go in the morning. The fully experienced Joes, Bills and Toms can't stand the financial strain of waiting . . . their time cards can become travel tickets to new jobs, while you're struggling to replace the ravages of fire.

The threat of losing your skilled labor due to an unexpected fire tragedy can be fully eliminated. With C-O-TWO Smoke or Heat Fire Detecting Systems plus C-O-TWO High Pressure or Low Pressure Carbon Dioxide Type Fire Extinguishing Systems your plant can have fast, positive, round-the-clock fire watchman service simultaneously at each fire hazard point.

At locations where a deep-seated, smoldering internal fire as well as a fast burning external fire might occur, the smoke detector of a C-O-TWO Smoke Fire Detecting System, based on an exclusive operating principle, automatically detects the first trace of smoke, smoldering or fire.

For locations where excessive heat or combustion might cause a flash fire, the heat detectors of a C-O-TWO Heat Fire Detecting System automatically sound a warning at the first flash of fire.

Then clean, dry, non-conducting, non-damaging carbon dioxide is instantly released from either a C-O-TWO High Pressure or Low Pressure Carbon Dioxide Type Fire Extinguishing System into the threatened area. The fire is out in seconds with little if any interruption to operations and the carbon dioxide disappears without a trace . . . one of the safest fire extinguishing agents known . . . harmless to equipment, materials and finishes.

WHEN BUSINESS STOPS . . . INCOME STOPS!

Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today . . . our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

Charlie Vaughn reports:

"In 12 years I've never had a complaint on the LOCKE 6" Deadend!"

CHARLIE VAUGHN, our North Central Regional Manager, cut his eye teeth on the insulator business years ago in Georgia. Since then, he's sold and serviced insulators in every state east of the Mississippi, has bumped up against all kinds of operating conditions. With this background, Charlie can speak with authority on insulator performance. Incidentally, his Locke regional operation stretches from Wisconsin to Harrisburg, Pa., and south from Michigan to Kentucky.

"CURVATURE, CLEARANCE, THICKNESS,

make it the toughest 6" Disc on the market", says Charlie.

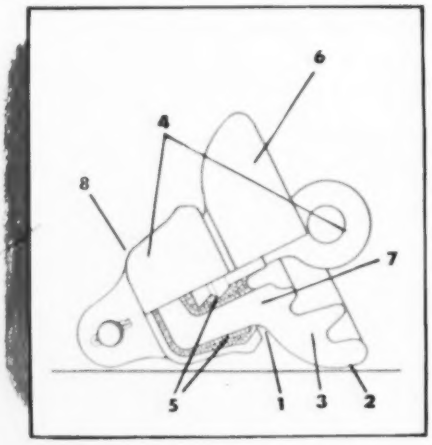
By Curvature, Charlie's talking about the way the Locke shell drops away from the cap at a larger angle than any other shells you've seen. This prevents breakage during shipment, and through various handling stages from our factory to your warehouse, and from warehouse to your job location.

By Clearance, Charlie means the spacing between the edge of the cap and shell. It's a good deal greater than normal. Charlie says this reduces the possibility of "donuting", helps insulator resist breakage when stresses are applied.

By Thickness, Charlie means the thickness of the porcelain shell in the sections at right angles to the surface of the porcelain. Charlie says this means that this 6" disc gives you a porcelain build-up other insulators don't have at points where you need it most . . . namely, points of greatest stress.

On next page Charlie illustrates these, and other advantages you get by using Locke 6" Deadends (our No. 16583) for your low voltage applications

Here Charlie Vaughn shows you why Locke's 6" Disc is the best insurance you can buy against breakage hazards—



1. Says Charlie, "Note larger clearance between edge of cap and shell. This prevents application of pressure on porcelain surface by edge of cap. This helps eliminate any chance of breakage."

2. "The top contour or curvature of porcelain has been so designed that the 'lay point' permits insulator to roll around in trucks, and across warehouse floors, without breaking," explains Charlie.

3. Charlie makes the point that "the thickness of the porcelain shell considerably exceeds that of conventional deadend insulators and thereby practically eliminates breakage".

4. "My customers are always impressed by the fact that the cap and pin are coated with the same coating we put on our high voltage insulators. It's Permazinc—Locke's quality-controlled hot dip galvanizing," says Charlie.

5. "Locke sand bands at the head of the porcelain shell put this zone in surface compression," says Charlie, "thus giving added strength and reliability."

6. "Another strength factor," reports Charlie, "is Locke Compression Glaze which makes the insulator stronger because of its ability to hold the surface in compression."

7. "No holds barred," asserts Charlie, "Locke Wet-Process porcelain is absolutely the best on the market. The answer is factory control operations. Come to our factory and see for yourself," Charlie always tells his customers.

8. "Electrical storms, snow and ice present no problems for our 6" disc," says Charlie. "Under these conditions, it simply has no equal."

YOU ARE EQUALLY SURE of getting a masterpiece of design when you specify other products in the complete line of Locke insulators and suspension hardware. Each pays off in superior performance on transmission and distribution lines, generating stations, sub-station and electrical apparatus. Locke Department, General Electric Company, Baltimore, Md.

LOCKE

LOW VOLTAGE PIN TYPE INSULATORS

HIGH VOLTAGE PIN TYPE INSULATORS

SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

SPOOL INSULATORS

GUY INSULATORS

LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

SUSPENSION HARDWARE

ENTRANCE BUSHINGS

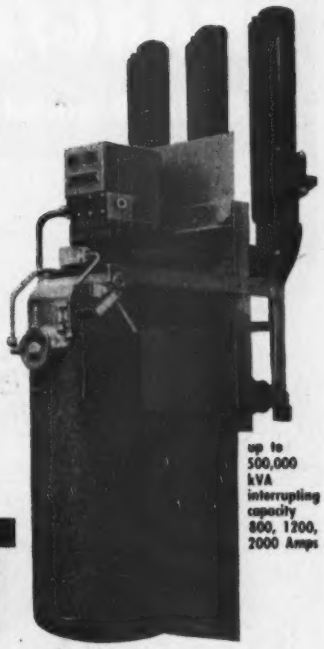
Presenting ▶

THE NEW

BROWN BOVERI

DRAW-OUT

AIR BLAST BREAKERS



Only the *new* Brown Boveri development—the DRAW-OUT AIR BLAST BREAKERS—designed to replace Magnetic Breakers—offers ALL these advantages:

- ▶ Self-contained unit adaptable to any cubicle design.
- ▶ High Speed Operation (2½ cycles)
- ▶ No difficulties when interrupting magnetizing currents.
- ▶ No re-strikes on capacity switching.
- ▶ Will handle purely capacitive loads up to full current rating.
- ▶ Exceedingly small contact wear. (Contacts will stand 100 full capacity interruptions without upkeep or replacement.)
- ▶ No arc chutes to be cleaned.
- ▶ Control mechanism safely accessible without withdrawing breaker.
- ▶ Light weight, easily removable. Immediate accessibility of strategic parts after breaker is withdrawn.
- ▶ Reasonably priced, prompt deliveries.
- ▶ Incorporates all the advantages of Brown Boveri Air Blast Breakers—quality-wise, performance-wise, with minimum maintenance. In short, a superior breaker for the industrial switchgear field.

WRITE TODAY FOR A QUOTATION ON YOUR NEEDS!

BROWN BOVERI

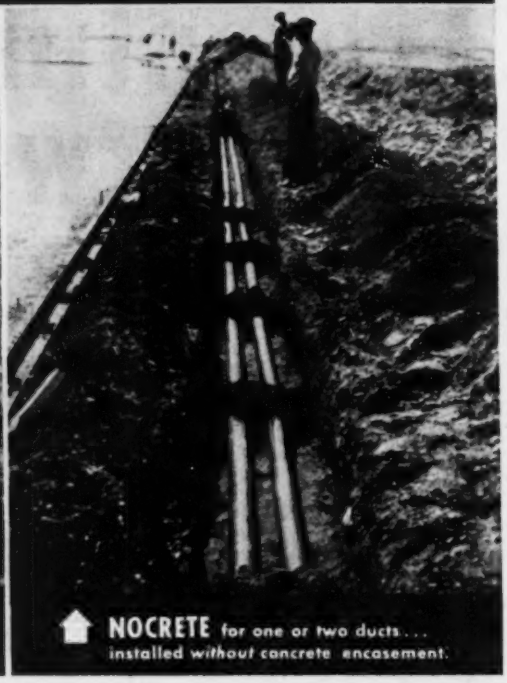
BROWN BOVERI CORP.

19 Rector Street New York 6, N. Y.

ORANGEBURG® *Fibre* CONDUIT

STANDARD *installed with Concrete* · **NOCRETE** *installed without Concrete*

STANDARD for three or more ducts ... installed *with* concrete encasement.



NOCRETE for one or two ducts ... installed *without* concrete encasement.

ORANGEBURG
OUTSTANDING FEATURES

- Impermeable Walls — non-corrodible, resistant to acids and alkalies.
- Water-tight Taper Sleeve Joints keep out corrosive ground waters.
- Low Co-effection of Friction reduces pulling tensions on cables.
- Smooth Bore protects cables from injury when pulled in — and during movement from load.
- Lightweight 8-foot Lengths are quickly assembled—easily tooled on the job.
- Tough, Resilient — Orangeburg does not crack or break when properly laid.
- Orangeburg lays faster and at lower cost than any other type of conduit.

• When public utilities, industries and municipalities use Orangeburg Fibre Conduit year after year and in ever-increasing *quantities*, you can be sure the *quality* is *right*. You can be certain that Orangeburg gives the vital cables the unceasing underground *guardianship* they must have.

Orangeburg's outstanding features—as listed on this page —are many and impressive and account for the product's nationwide acceptance.

It is a product of low *initial* costs—with a 58-year record for permanent cable protection.

An added time and money saver is the complete line of Fittings—including angle couplings and bends—that Orangeburg makes available. Booklet on request. Write Dept. EW-8. Orangeburg Manufacturing Co., Inc., Orangeburg, New York.

GraybaR ELECTRIC COMPANY

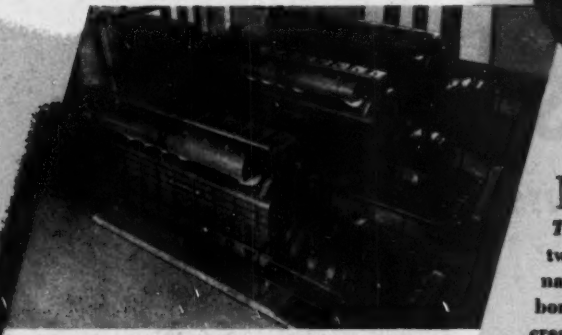
DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

GENERAL ELECTRIC SUPPLY CORPORATION

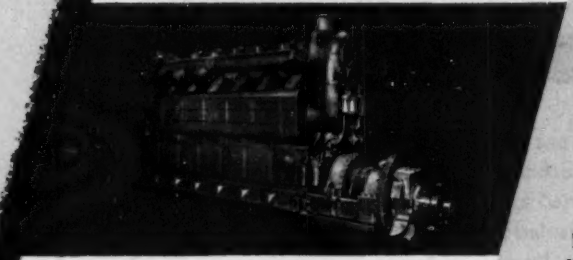
BRANCHES AND STOCKS IN PRINCIPAL CITIES

How to DOUBLE YOUR HORSEPOWER WITHOUT INCREASING YOUR FLOOR SPACE.....

with the NORDBERG Supair Thermal Engine



Above: Three 8-cylinder Nordberg FS-138-HSC, *SUPAIRTHERMAL* 1000 kw, 450 rpm generating units at N. V. Overzeese Gas En Electriciteit Maatschappij, an electric utility in Aruba, N. W. I.



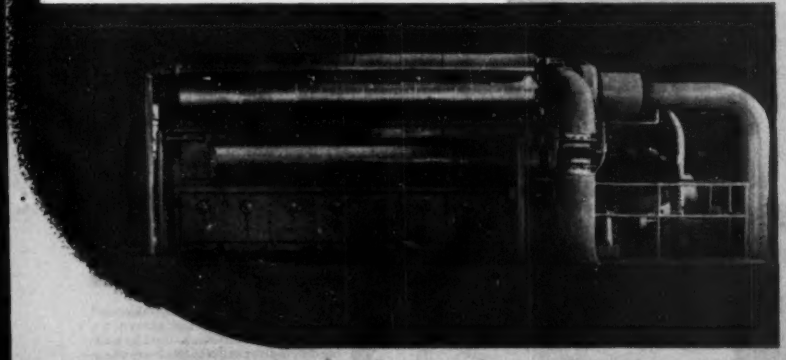
Above: Nordberg 6-cylinder FMD-136-HSC, *SUPAIRTHERMAL* engine developing 800 bhp at 300 rpm, for direct drive—direct reversing—propulsion of tugboat owned by Foss Launch and Tug Company, Tacoma, Wash.

NOW, with the Nordberg *SUPAIRTHERMAL* Engine,* you can actually get twice the horsepower output over an ordinary normally-aspirated engine of the same bore, stroke and speed . . . without any increase in floor or overhead space. Thus, you can pack twice the power in a limited plant space, or in an engine room on board ship.

In addition to doubling the horsepower in the same space, the *SUPAIRTHERMAL Engine* produces *more horsepower hours per unit of fuel and lube oil* . . . with *lower installation cost. Maintenance cost per horsepower generated is also lower.*

Here, then, is the outstanding engine in the entire Diesel field . . . available for all power applications, in a full range of 4-cycle types for fuel oil, Duafuel, or spark ignition gas operation—in sizes from 535 hp upward. *For full details on the SUPAIRTHERMAL Engine write for BULLETIN 191.*

*Patents Pending



Left: Nordberg 8-cylinder FS-168-HSC *SUPAIRTHERMAL* engine developing 2100 horsepower at the Fernandina, Florida, plant of the Florida Public Utilities Company.

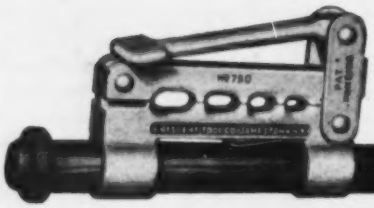
NORDBERG MFG. CO.
Milwaukee, Wisconsin

P-SM152

NORDBERG
DIESEL ENGINES

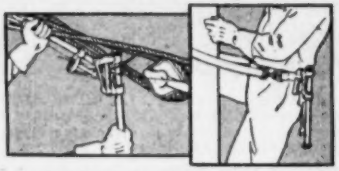
CRESCENT SLEEVE WRENCHES

PRODUCE BETTER JOINTS FASTER... SAFER



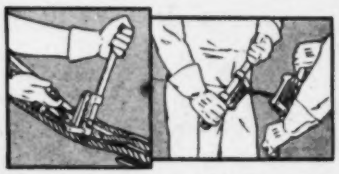
● Crescent No. 750 Sleeve Wrenches not only produce a far better sleeve joint but definitely reduce working hazards. Oil-impregnated hickory handles assure almost perfect insulation, prevent flash if contacted with hot wire. Design of the openings is such that maximum strength of the joint is assured. For use with single or double tube sleeves . . . available in over 375 different opening combinations. Order in pairs from your supply house, or write us for complete information.

INSURE 90-98% PERFECT JOINTS



SLIDING HANDLE CLEARS TACKLE. NO UNCLAMPING

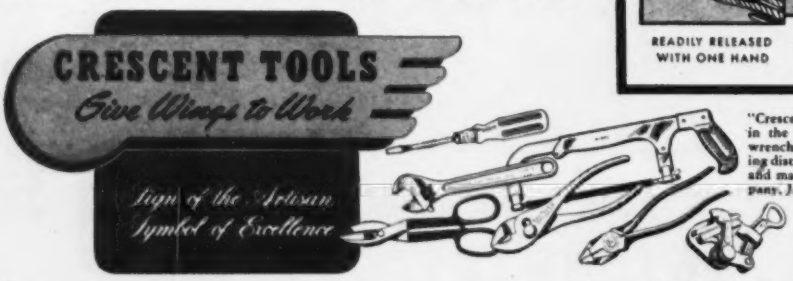
HANGS SECURELY IN BELT



READILY RELEASED WITH ONE HAND

SIX FULL TURNS WITHOUT DAMAGE TO SLEEVE

CRESCENT TOOL CO., JAMESTOWN, N. Y.

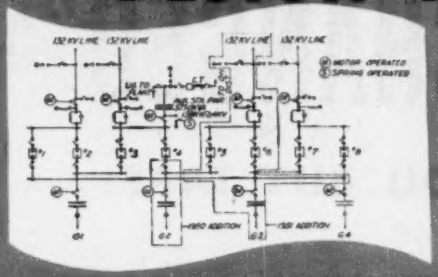


"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by Crescent Tool Company, Jamestown, N.Y.

here's the easy way to solve

your substation

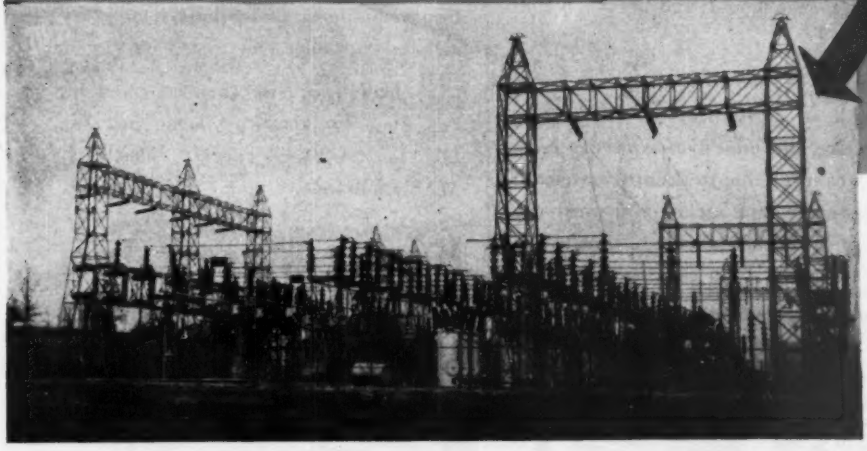
DESIGN PROBLEMS



STEP 1—Make one line diagram with specifications. No station layout required.

STEP 2—Submit to Southern States.

STEP 3—The station shipped to job site ready for erection.



Through the years Southern States' experienced team, skilled in engineering, procurement and manufacturing, has provided **single responsibility service** in meeting your substation requirements. Whether it be detailed engineering or materials ordering for job site delivery, we relieve you and your staff of the many details necessary to coordinate procurement with construction schedules.

Southern States Equipment Corp.

HAMPTON GEORGIA

How to be Sure You Don't get "SHORT-CHANGED"

...NEXT TIME YOU BUY TAPE!

While minimum length can be depended on to be accurate in any roll of tape, it's the *weight* of the roll that you must watch. It is important for you to know: Does the No. 4 Roll actually weigh 4 ounces, as it should; and the No. 8 Roll 8 ounces?

For weight reveals whether tape is full strength in substance, or whether its protective and adhesive properties have been weakened due to skimpy materials. Underweight tape means you must use more of it, and take the extra time to roll more on, when a job requires maximum tape protection.

You can always weigh every roll you buy, of course, but why bother, when HAARTZ-MASON publicly makes you a DUAL GUARANTEE — a guarantee covering both weight and length, and prints this information boldly on every roll and container.

So get full measure the next time you buy tape by accepting none but the DUAL GUARANTEED HAARTZ-MASON brands.

Haartz-Mason, Inc.

WATERTOWN 72, MASSACHUSETTS

PARAPLASTIC Plastic Tape that does the work of both rubber and friction.

Note: Weight and length information are printed boldly on every roll and container.

MIDWEST
PREFABRICATED PIPING

SAVES LABOR

SAVES TIME

SAVES MONEY

SAVES TROUBLE

From A Simple Bend

Or Welded Assembly

To Complete Piping Systems For Power Plant

Or Process

Call On MIDWEST

Midwest Shop-Fabricated Piping saves labor, time, money and trouble in erection. Subassemblies are always practical, with the difficult operations performed in the fabricating plant. Field welding is simplified as much as possible. All pieces are accurate in alignment and dimension . . . they are thoroughly cleaned to remove all scale and dirt . . . carefully inspected and tested . . . stress relieved when necessary . . . ready to erect quickly, easily at lowest cost. It is to your advantage to use Piping Prefabricated by Midwest.

MIDWEST PIPING SERVICE IS NATION-WIDE

4 Plants Are Better Than 1

PIPING FABRICATORS AND CONTRACTORS

MIDWEST PIPING & SUPPLY CO., INC.

Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices: New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol Ave.
Tulsa 3—324 Wright Bldg. • Boston 27—426 First St.

STANDARD suspension insulator, recommended for most installations. Many such units now past 30 years in satisfactory service.

THICK SHELL. Two pounds of extra porcelain, in extra thickness of section for an extra 60% in impact strength. Insurance for inexperienced construction crews!

HIGH STRENGTH. 25,000 lbs. For heavier lines or dead-ending long spans—and proof in long service that high strength and long life go together.

8 SUSPENSION INSULATOR UNITS

SUPER STRENGTH. 36,000 lbs. "Jumbo" of suspension discs, for long spans, elimination of yokes.

FOG-TYPE. 65% extra leakage distance—"self-cleaning" corrugations. Greatly reduces need for cleaning in those areas of even severest contamination.

HIGH STRENGTH FOG-TYPE. The whole answer for heavy construction, long spans, or extra factors of safety for service in contaminated atmosphere.

6" DEAD-END. Built to the same standards as transmission insulators, these units provide an extra margin of security for distribution or rural dead-ending.

FOG-TYPE DEAD-END. Drainage corrugations for use in dirt conditions. Small diameter is also a convenience where close spacing of lines is necessary.

. . . ALL OF LAPP PORCELAIN

These are suspension insulator units built by Lapp with the idea that long service and low upkeep depend on *—a sound porcelain—severely tested —assembled so it will live.* There's no more spectacular demonstration of the superiority of Lapp Porcelain than your successors will find in the service records of the lines you build on Lapp suspension insulators now.

Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

OW! Do your struction fastening up 100 times faster with REMINGTON STUD DRIVER ... and do it safely!

NEW CARTRIDGE-POWERED MODEL 450

This revolutionary tool attaches steel or wood structural pieces to concrete or steel surfaces in seconds ... cuts costs and working time on construction jobs. Completely self-powered, the Stud Driver sets as high as 5 studs per minute ... with no outside power source or other equipment required. Studs have pull-out resistance as high as two tons!

Test-proved to be the world's finest and speediest fastening system, the Model 450 Remington Stud Driver is made by Remington Arms Company, Inc., *America's oldest and foremost sporting arms manufacturer*. Price for Model 450, complete in rugged steel carrying case—only $119.50. To obtain detailed information on this time and money-saving tool, and for the name of your nearest distributor, fill out and mail the coupon below.

Speeds all these jobs . . . and many more!

1. Attaching conduit and panel boxes to steel, concrete or brick.
2. Anchoring fluorescent and other lighting fixtures in concrete.
3. Radio and television fastening.
4. Fastening conduit clips to concrete or steel.
5. Fastening eye bolt in concrete for stringing wires.

Simply hand-assemble stud and power cartridge, load as a unit in easy-to-open Remington Stud Driver, and close.

Press loaded Stud Driver firmly against surface, depress safety lever and pull trigger. Explosive charge imbeds stud solidly.

"If It's Remington—It's Right!"

Remington DUPONT

Remington Arms Company, Inc.
Industrial Sales Division, Dept. EW-8
939 Barnum Ave., Bridgeport 2, Connecticut

I am interested in obtaining detailed information on the Model 450 Remington Stud Driver.

Name _____

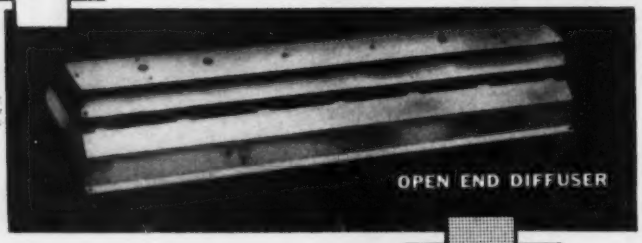
Firm _____

Position _____

Address _____

City _____ *State* _____

UP and DOWN LIGHTING
for better seeing conditions



Wheeler
DIFFUSER TYPE
FLUORESCENT FIXTURES

Get the benefits of greater seeing comfort — reduced brightness contrasts — with the new DIFFUSER TYPE Fluorescent Fixtures — pioneered by Wheeler! Apertures located in the top of the all-white porcelain enameled steel reflector direct approximately 5% of the light upwards . . lessen contrasts . . provide more comfortable seeing and working conditions. Fixtures are available for use with all Slimline and General Line Fluorescent Lamps. Write Wheeler Reflector Company, 275 Congress Street, Boston 10, Massachusetts.

Wheeler REFLECTORS

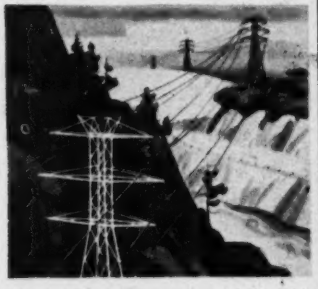
Distributed Exclusively Through Electrical Wholesalers

MADE BY SPECIALISTS IN "SKILLED LIGHTING" EQUIPMENT SINCE 1881

ADVERTISEMENT

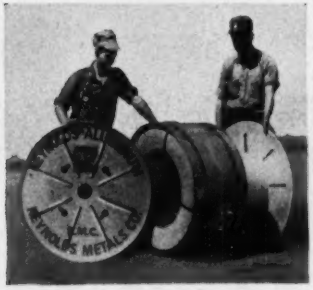
Electrical Applications of Aluminum

Aluminum Cable Steel Reinforced

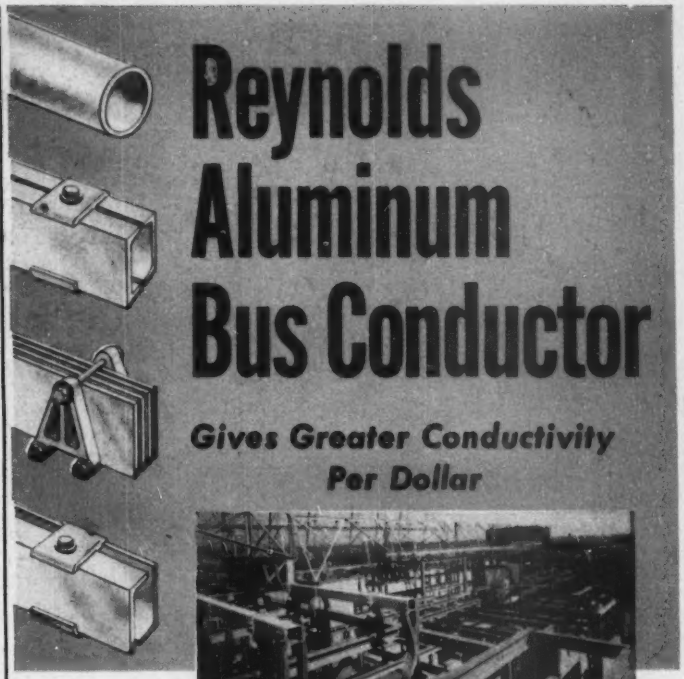


Worthwhile savings are yours with Reynolds ACSR because the initial price of this steel reinforced aluminum cable is less and you save through reduced handling and field costs. For example, men and equipment are handling 20% less weight with Reynolds ACSR. Easier, faster stringing is bound to result. ACSR is light yet strong—you can go to longer distances between poles—save up to four poles per mile. Or, because there is less sag to ACSR—you can use shorter poles or towers. Reynolds offers engineers a free ACSR manual with full information on line design and erection . . . sag-tension charts, staking tables, stringing-sag tables, etc. Please request on your business letterhead.

Master Reel and Coil Service

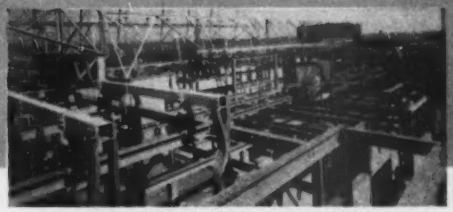


Reynolds offers a Master Reel and Coil Service that goes hand-in-hand with Reynolds ACSR toward saving important time, money and labor. Reynolds all metal Master Reels sharply decrease handling, storage and bookkeeping costs. Four Master Reels actually take the place of one hundred wooden reels. They're easily taken apart and re-assembled around the Master Coil by linemen in the field. Reynolds Master Coils hold the same amount of conductor as conventional wooden reels. They're carefully waterproofed, lagged and banded for complete protection in transit and on the job. For further details, write Reynolds Metals Company or see one of these Reynolds distributors: Westinghouse Electric Supply Co., New York, New York (And branches) • Griffin Manufacturing Co., Dallas, Texas • Williamson Sales Co., Shreveport, Louisiana (And branches) • Hughes Electric Supply, Orlando, Fla. • Maydwell & Hartzell, Inc., San Francisco, Calif. • Power Line Equipment Co., Wichita, Kans.



Reynolds Aluminum Bus Conductor

Gives Greater Conductivity Per Dollar



6 inch square extruded aluminum tubing used for 13 kv, 4,000 ampere conductor in generating station.

Bus conductor made of Reynolds Aluminum costs less than conductor made of other metals—gives you *more* conductivity per dollar. Aluminum bus conductor assures other economies, too, because its lighter weight permits greater span lengths, reduces floor loads, allows faster, easier handling and saves on erection time and labor costs.

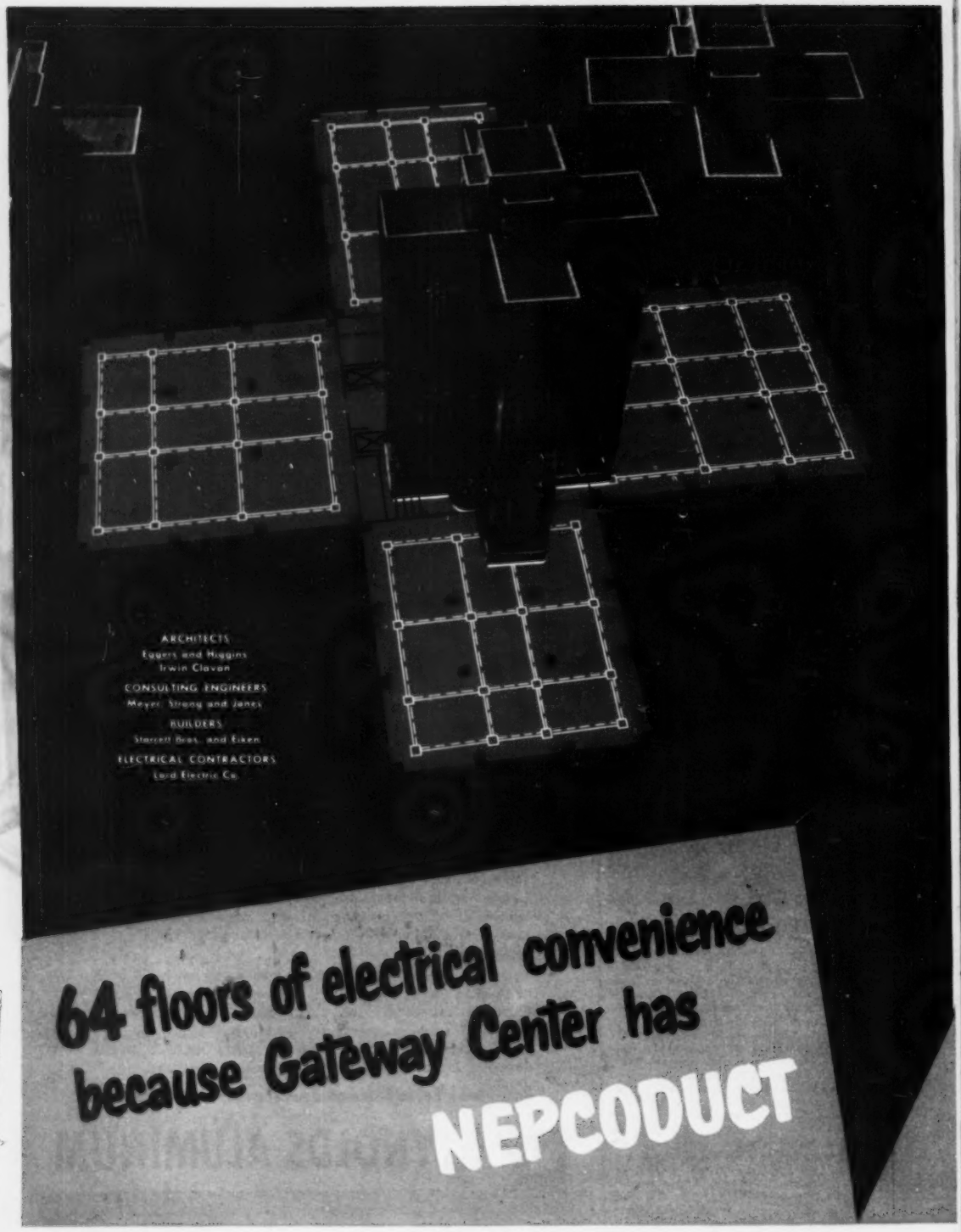
Aluminum bus conductor in form of rectangular bars, channels, angles, special extruded shapes and tubing is finding widespread application in utility generating plants and substations, in industrial installations and packaged power control and distribution units. For most uses, past technical problems have all been solved. So, before you plan your next job, consider these characteristics of aluminum: lower cost, high electrical conductivity, light weight with high strength, excellent resistance to corrosion, ease of fabrication, plus other factors favorable to individual applications.

Sooner or later you'll use aluminum—why not now? Start by sending for a copy of AIEE conference paper, Drawn and Extruded Aluminum Products in Relation to the Electrical Industry. For design assistance on your specific applications call on Reynolds Aluminum technical specialists. *Reynolds Metals Company, 2584 South Third Street, Louisville 1, Kentucky.*

Remember—Reynolds technical assistance is always available.

REYNOLDS ALUMINUM

MODERN METAL FOR MODERN NEEDS


ARCHITECTS
Eggers and Higgins
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BUILDERS
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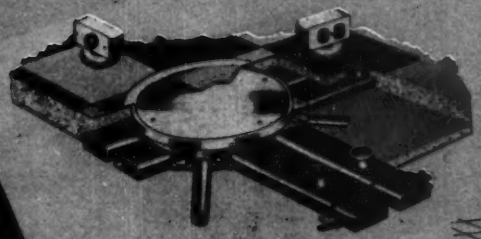
ELECTRICAL CONTRACTORS
Lord Electric Co.
64 floors of electrical convenience
because Gateway Center has
NEPCODUCT



There are 100,000 electrical convenience outlets in the first three units of Pittsburgh's multi-million dollar Gateway Center, thanks to Nepcoduct! Nearly 38 miles of National Electric's all-steel underfloor electrical raceway supply power for lighting, business machines, telephone, buzzer and signal systems in these ultra-modern office buildings.

Nepcoduct provides the ultimate in electrical convenience—outlets *anywhere* they are needed. No matter how often office layouts and movable wall partitions are changed, Gateway tenants have easy access to power and communication *at the floor surface*. Outlets are already threaded, ready to use, just below the floor cover.

Nepcoduct fits any type of floor construction—ideal for new construction or wiring modernization of OFFICES, FACTORIES and COMMERCIAL BUILDINGS.

Nepcoduct is a *permanent* wiring system. Yet it provides all the flexibility and convenience of temporary wiring *for all time*—at a fraction of the cost required for extension, expansion and relocation of ordinary wiring systems.

Easy to lay out . . . easy to order . . . easy to maintain. Steel for permanence . . . grounded for safety! Listed by Underwriters' Laboratories, Inc. Write for catalog and complete details.

National Electric Products

3 Plants • 6 Warehouses • 42 Sales Offices

National Electric Products Corp.
1305 Chamber of Commerce Bldg.
Pittsburgh 19, Pennsylvania

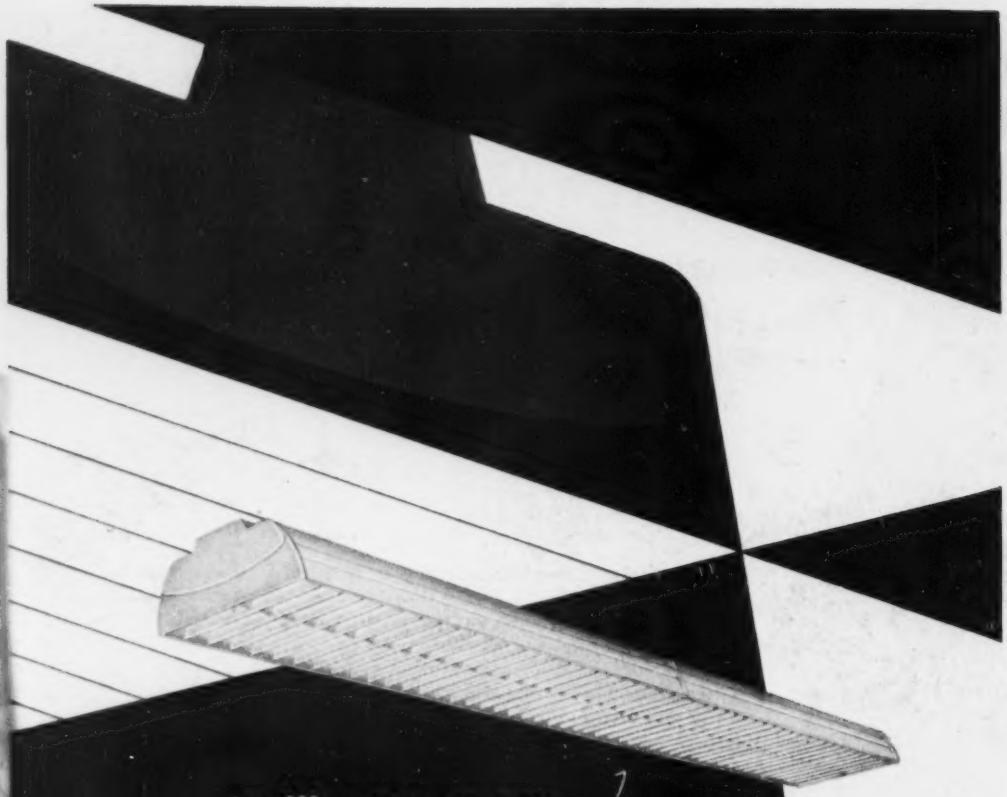
Please send me the illustrated Nepcoduct catalog.

Name_____

Title_____

Company_____

Address_____



miller LEXINGTON

new and most advanced for school lighting the fixture that gives you L.O.C.

L.O.C. (*low overall cost* — cost of fixture, cost of installation, cost of maintenance) is the *true* cost of any lighting fixture — an important consideration in buying or specifying. MILLER LEXINGTON gives you L.O.C. And further, it gives you ideal lighting which will minimize eye-strain and fatigue. The LEXINGTON embodies the latest advancements in illumination engineering. Built into it is the experience gained through 108 years of pioneering and progress in GOOD LIGHTING. It is the latest addition to MILLER'S complete line of luminaires for a wide range of commercial and industrial requirements.

Write or wire today —

Miller field engineers and distributors are conveniently located for nation-wide service.

— for full details of the new MILLER LEXINGTON luminaire, explaining its extremely low brightness and overall efficiency at L.O.C. (low overall cost.)

THE miller COMPANY MERIDEN, CONN.
SINCE 1844

ILLUMINATING DIVISION: Fluorescent, Incandescent, Mercury Lighting Equipment
HEATING PRODUCTS DIVISION: Domestic Oil Burners and Liquid Fuel Controls
ROLLING MILL DIVISION: Fluorescent Reflectors and Miller-Hi Steel; Strip and Rod

T&B METHOD
Fittings and Tools for ALUMINUM and Copper Conductors

FOR ACSR & ALL-ALUMINUM CABLES

Tension Splicers

Dead Ends

Jumper Splicers

Repair Sleeves

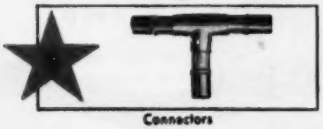
Light Portable Tools (for tower work)

FOR UNDERGROUND & INDOOR INSTALLATION

Splicers

Terminals

Taps



Connectors

CONDUCTANCE OF ACSR DEAD ENDS* IS BETTER THAN THE CABLE'S... when you use T & B Method Fittings

The body of a T & B Dead End for ACSR — a single aluminum tube — forms an uninterrupted current path. Conductance is higher than for the same length of cable! Patented T & B Method of compression scrapes oxide off cable for high cable-to-fitting conductance — develops 95% or more of listed cable breaking strength. You get a top-quality job — electrically and mechanically — with T & B Method Fittings!

TOOLING IS LIGHT — PORTABLE — POWERFUL . . . AND ECONOMICAL!

Tools are easy to carry — easy to use. An installing head weighing only 45 pounds develops 40-ton pressure. T & B Method saves you money because one tool and die install all fittings for a single size of ACSR cable.

ENGINEERED RIGHT . . . DISTRIBUTED RIGHT

T & B Method fittings and tools, like all T & B quality fittings, are designed for lowest installed costs. They're furnished exclusively through local T & B distributors under the T & B Plan.

FROM CIRCLE TO HEX IN SECONDS

You start with a circular cable (a typical one consists of about 75% metal, 25% air). You compress it, by the T & B Method, to the equivalent area of a solid rod—as the dies force the fitting from circular to the characteristic T & B Method hexagonal shape—all in the space of just a few seconds!

FOR THE FULL STORY ON THE T & B METHOD, WRITE FOR BULLETIN #57

THE THOMAS & BETTS CO.
INCORPORATED

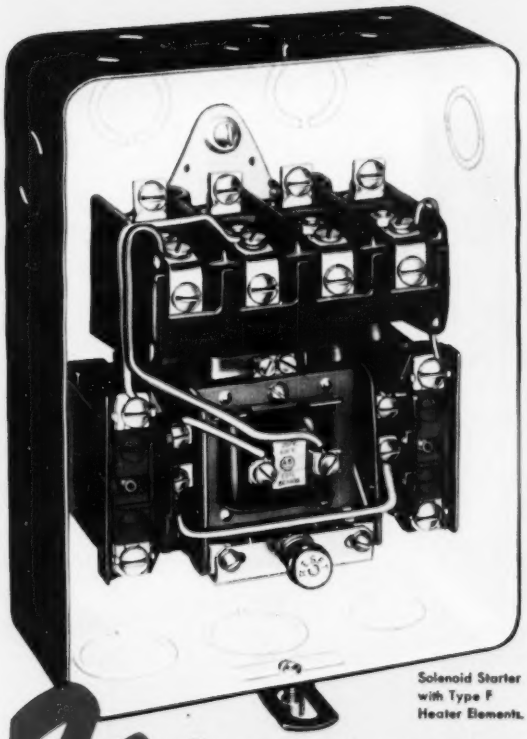
35 Butler Street
Elizabeth 1, New Jersey
Thomas & Betts, Ltd., Montreal, P. Q., Canada

British Columbia Electric Company Limited, in pioneering their 345-kv transmission line, has most modern installation in the Western Hemisphere. PREFORMED ARMOR RODS will protect the initial single conductor at the support points as well as the dual conductors, illustrated above, which are planned for ultimate installation.

Shown in the picture are, left to right: J. P. Fraser, assistant chief engineer, electrical division; F. O. Wollaston, superintendent of design, engineering division; T. Ingledow, vice-president and chief engineer; J. H. Steede, executive assistant to vice-president and chief engineer; H. W. Smith, assistant chief engineer, engineering division.

PREFORMED LINE PRODUCTS COMPANY

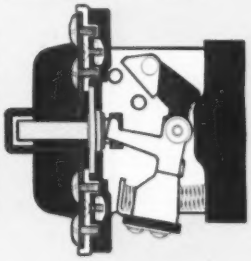
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO



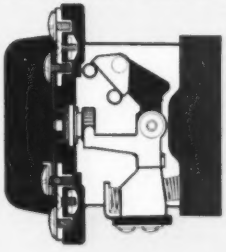
Solenoid Starter with Type F Heater Elements.

THERMAL OVERLOAD RELAY WITH CONVENTIONAL DUAL UNIT

Ordinarily, A-B overload relays have a soldered ratchet spindle (yellow) that is separated from heater strip (red). Heat radiated by overload heater melts solder on spindle and releases ratchet.



THERMAL OVERLOAD RELAY WITH SUPER-FAST COMBINATION UNIT



New, super-fast element has soldered ratchet (yellow) brazed directly on heater strip (red), permitting quick transfer of heat to melt the solder and thereby release the ratchet.

New SUPER-FAST COMBINATION UNIT

for protecting hermetically sealed motors used in refrigeration compressor service

Most motors used for hermetically sealed compressors are cooled by the refrigerant circulated over the motor windings. They are worked beyond the limit of air-cooled motors, and have little overload reserve.

To give dependable overload protection to these hard-working motors, Allen-Bradley has added the new Type F quick-acting heater element. Its special construction, described above, makes it respond within a few seconds to any overload, and trips the overload relay before motor burnout occurs.

If you need motor controls that are quick-acting in case of overload, specify Type F combination elements for Allen-Bradley solenoid starters.

Combination Unit
for super-fast operation

TYPE F ELEMENT
Soldered ratchet spindle is brazed to heater for rapid conduction of heat to solder.

Dual Unit
for average operation

SPINDLE

HEATER

ALLEN-BRADLEY CO.
1316 S. Second St.
Milwaukee 4, Wis.

ALLEN-BRADLEY
OVERLOAD PROTECTION

A-B Quality

5-52-MR

Pick the right spindle to fit the starting cycle.

Insert the spindle in the A-B thermal overload relay.

The relay is ready for the heater element.

It's so easy to provide Starting and Running Protection with Allen-Bradley Thermal Overload Relays

INTERCHANGEABLE RELAY SPINDLES

TAN SPINDLE—for normal allowable locked rotor time and long starting time.

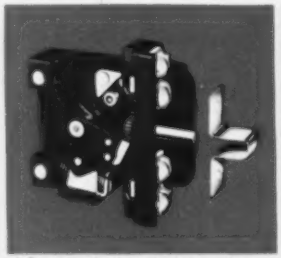
RED SPINDLE—for normal allowable locked rotor time and normal starting time.

GREEN OR GRAY SPINDLE—for low locked rotor current and short allowable locked rotor time.

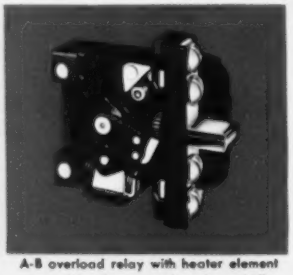
SUPER FAST SPINDLE—for low locked rotor current and extremely short locked rotor time.

FIRST—to provide locked rotor protection—pick the overload relay spindle (see pictures at left) that matches the motor characteristics. There is an Allen-Bradley relay spindle to meet every need.

SECOND—to provide running protection—pick the heater element (see pictures at right) to fit motor full-load current. There is an Allen-Bradley heater element for every rating. This two-way protection is standard for all Allen-Bradley solenoid motor controls.



A-B overload relay with heater element detached to show the relay spindle.



A-B overload relay with heater element mounted in place over the relay spindle.

INTERCHANGEABLE HEATER UNITS

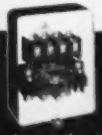
LOW RATING

MEDIUM RATING

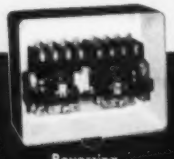
HIGH RATING

ALL ALLEN-BRADLEY SOLENOID MOTOR CONTROLS HAVE TWO-WAY OVERLOAD PROTECTION

Manual Starter

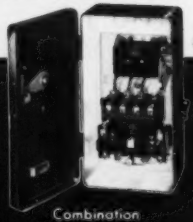


Automatic Starter



Reversing Starter

Multispeed Starter



Combination Starter

5-52-MR

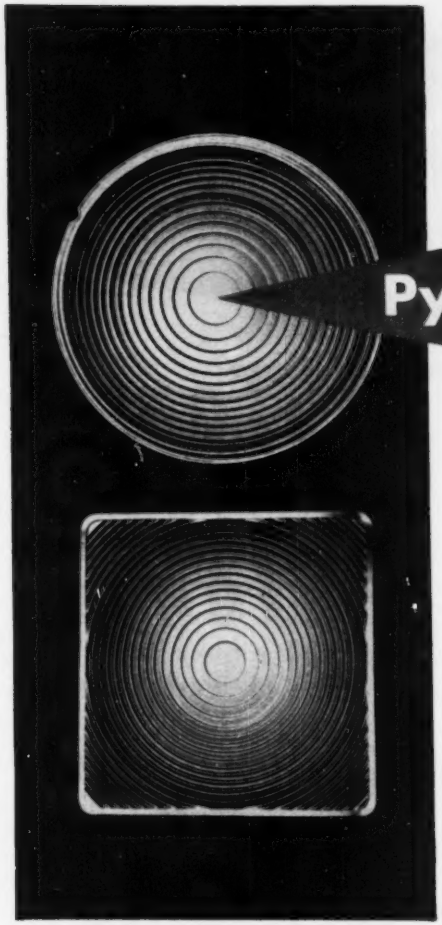
A-B Quality

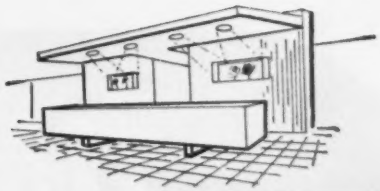
ALLEN-BRADLEY

SOLENOID MOTOR CONTROLS

QUALITY

ALLEN-BRADLEY CO.
1316 S. Second Street
Milwaukee 4, Wis.





Pyrex® brand Lenslites

give you **unusual design flexibility**

For a variety of distinctive lighting effects at low cost—plan on using PYREX brand LENSLITES. They offer a highly flexible medium for control of incandescent light sources. Wide variations in light distribution can be obtained simply by changing the position of the lamp and reflector relative to the LENSLITE, or by using various distribution patterns in the glass itself.

Heat-resistant PYREX brand LENSLITES can be used with lamps up to 1000 watts without danger of heat breakage. Carefully engineered prisms assure precise light control and minimize brightness. Stippled rear surface produces smooth, even illumination.

Available both round and square in a number of sizes and in concentrating, wide, and extra-wide angle distribution patterns, PYREX brand LENSLITES may be obtained from leading fixture manufacturers. For complete design data and specifications send for Bulletin LS-9. Simply mail the coupon.

TEMPERED PYREX LENSLITES for institutional applications . . . Tempered by a special heat treating process, PYREX LENSLITES are *immediately available* in sizes 8" and 12" for use in hospital psychiatric wards, prisons and similar institutions where law requires. Should glass be broken, it shatters into tiny particles. Larger sizes can be tempered to order.

APPLICATION SUGGESTIONS—Used in recessed ceiling fixtures with the lamp at focal length, with concentrating pattern, LENSLITES provide high intensity concentrated beams for accent lighting in stores, restaurants, etc.

When the lamp is moved closer to the lens, or with wide or extra-wide angle patterns, the beam spreads proportionately. This creates soft lighting effects for restaurants, banks and cocktail lounges.

By offsetting the lamp, light beam offsets up to 20° are possible. This is particularly desirable for display lighting and for special effects.

CORNING GLASS WORKS
CORNING, NEW YORK
Corning means research in Glass

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CORNING GLASS WORKS, Dept. EW-8, Corning, N. Y.
Please send me Bulletin LS-9, describing PYREX® brand Lenslites.

Name_____ Title_____
Firm_____
Address_____
City_____ Zone_____ State_____

Nicopress

The Tool and the Sleeve

that are made to work together

together they make the perfect splice

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

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Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

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new **PACKAGED** carbon dioxide

FIRE EXTINGUISHING SYSTEM

perfect for transformer vaults

Do you want maximum fire-fighting power at minimum cost? Then you want the new Kidde Standard Pak. It's an inexpensive ready-made system you can build in for automatic protection against tough fires in transformer vaults.

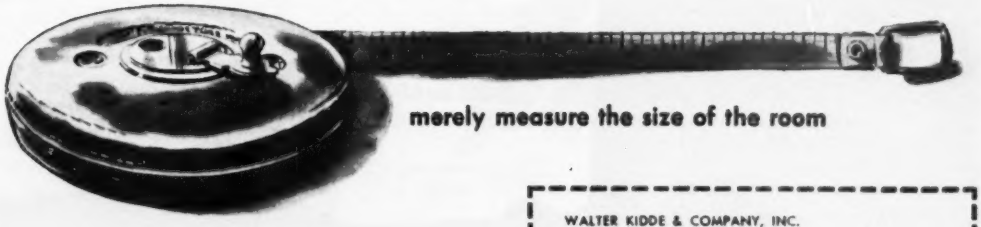
Anyone who can cut pipe can set up this pre-engineered fire extinguishing "package." Choose from six sizes for volumes up to 6,000 cubic feet.

Every kit contains Kidde rate-of-rise heat detectors, Kidde Multijet nozzles, and automatic discharge heads. Pipe and fittings are optional, as are pressure trips and switches, remote controls, sirens, gongs.

For full information send the coupon.

any pipefitter can install it

pre-engineered



merely measure the size of the room

Kidde

Walter Kidde & Company, Inc.
830 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

WALTER KIDDE & COMPANY, INC.
830 MAIN ST., BELLEVILLE 9, N. J.

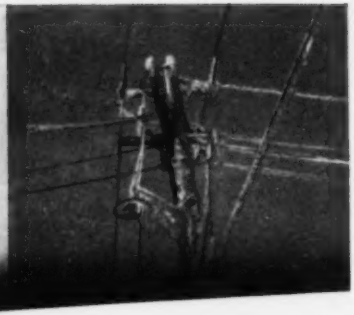
Gentlemen. Please send me details o. *te* New Kidde Packaged Fire Extinguishing System.

NAME_____

FIRM NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____



When an

ICE STORM CAUSED SINGLE PHASING

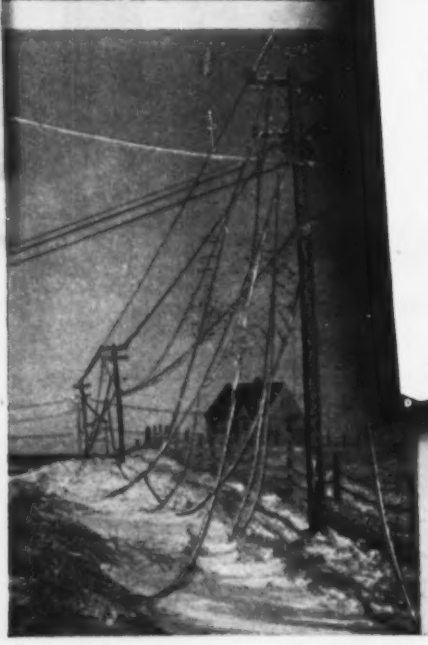
and low voltage conditions . . we blew a flock of Fusetron fuses but we saved over 40 motors from burnout

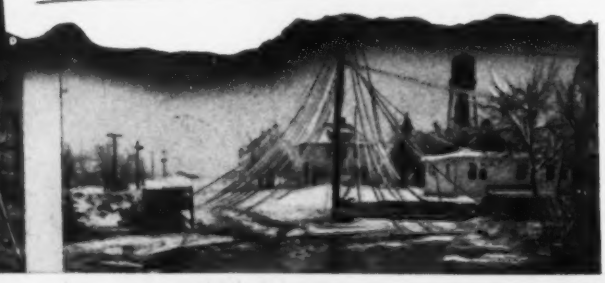
"For twenty-four hours after the bad ice storm of February 15, 1950 we were endangered by single phasing and low voltage conditions due to the damage done the power lines by the ice.

"During this period, we blew a flock of Fusetron dual-element fuses—around 240 in fact—but we figure that was a very cheap price to pay for saving over 40 motors from burning up.

"After this experience we didn't lose any time in putting all of our plant and equipment under Fusetron Fuse protection."

Michael G. Kupcho,
Master Mechanic
Ashland Shirt and Pajama Company
Ashland, Pennsylvania





You too, can be safe from electrical hazards by using

Fusetron Fuses

They provide 10 Point Protection

1 • Protect against short-circuits.

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating — lesser resistance results in cooler operation.

4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

Mated Rotors

"Obtaining will not smea when some on cement on th Rotorgear t

FUSETRON

TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION

BUSS

DON'T RISK LOSSES IN YOUR PLANT

Delay may cost you more than replacing every ordinary fuse with a FUSETRON dual-element Fuse — but by passing the word along that all purchase and stock records should call for FUSETRON dual-element fuses, you have action that begets money saving.

SEND THE COUPON FOR MORE FACTS

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element Fuses.

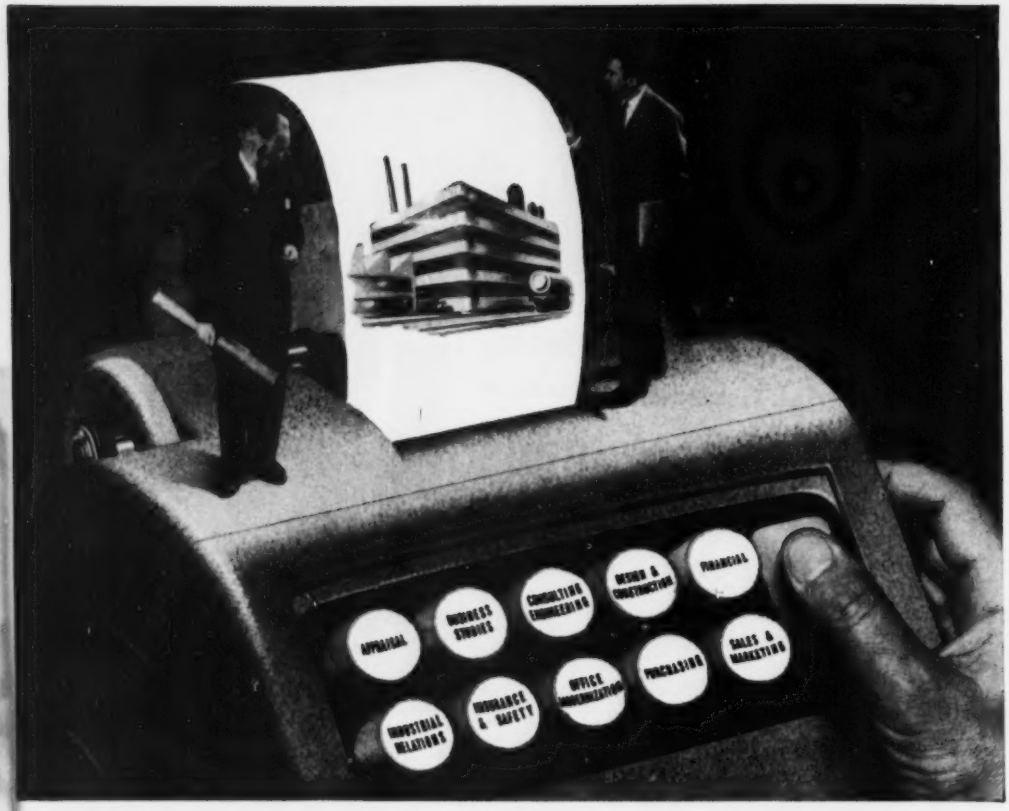
Name _____ Title _____

Company _____

Address _____

City & Zone _____ State _____ 852

(FUSETRON is a trade mark of Bussmann Mfg. Co., Division McGraw Electric Co.)



services that add up to efficient business operation

Can you keep enough specialists on your company's staff to cope with all the special problems that arise? Few businesses can. Yet, when such problems *do* occur, prompt solutions are imperative. That's why so many progressive firms call on EBASCO for a particular service or combination of services required to maintain efficient operation.

EBASCO makes available to your firm a vast pool of specialized talent . . . men trained to solve problems involving virtually every phase of business and industry. During the past half century EBASCO has set up industrial relations and pension programs, made sales and marketing studies, and helped to solve production problems. EBASCO engineers have planned and built over a billion dollars worth of new plants. Their financial consultants have advised on the raising of more than two billion dollars in new capital.

This history of solid accomplishment can be brought to bear on your business and industrial problems, regardless of the size of your firm. EBASCO teamwork supplies you with specialized assistance that will pay for itself many times over.

For a full story of EBASCO's scope of operations, write for your free copy of "The Inside Story of Outside Help." Address: Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

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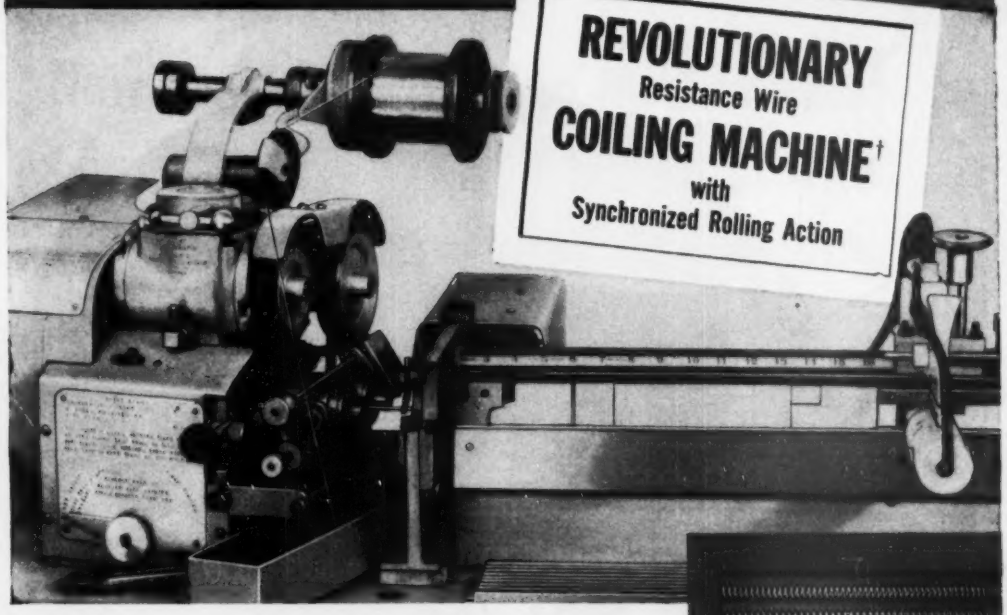
DRIVER-HARRIS ANNOUNCES . . .



As producers of the world famous "Nichrome"* and other outstanding electric heating and resistance alloys, Driver-Harris engineers are interested in obtaining application results commensurate with the exceptional advantages their alloys afford. Therefore they have developed a new coiling machine which eliminates wire coiling faults—especially coil irregularity due to work-hardened areas produced during coil formation.

This new machine is the result of knowledge accumulated during forty years of close association with wire coiling problems. Its revolutionary principle of operation—*the synchronized rolling action of all coiling parts*—results in vastly improved performance over that of any other type machine.

Product of long study and a thorough knowledge of the requirements of the industry, this Driver-Harris unit—

(1) handles the full range of resistance wire coiling normally required, close or open winding (and can be adapted for twin wire coiling);

(2) cuts coil ends clean on all sizes, close or open wound;

(3) maintains resistance accuracy of cut coils at all times by photo-electric control (variation not exceeding ± 1%);

(4) affords the lowest operational and maintenance costs of any comparable coiling machine.

Standard Model coils #20 to #36 B&S gauge wire. Units for other gauges built to order. Send for illustrated Bulletin C-52, giving full information.

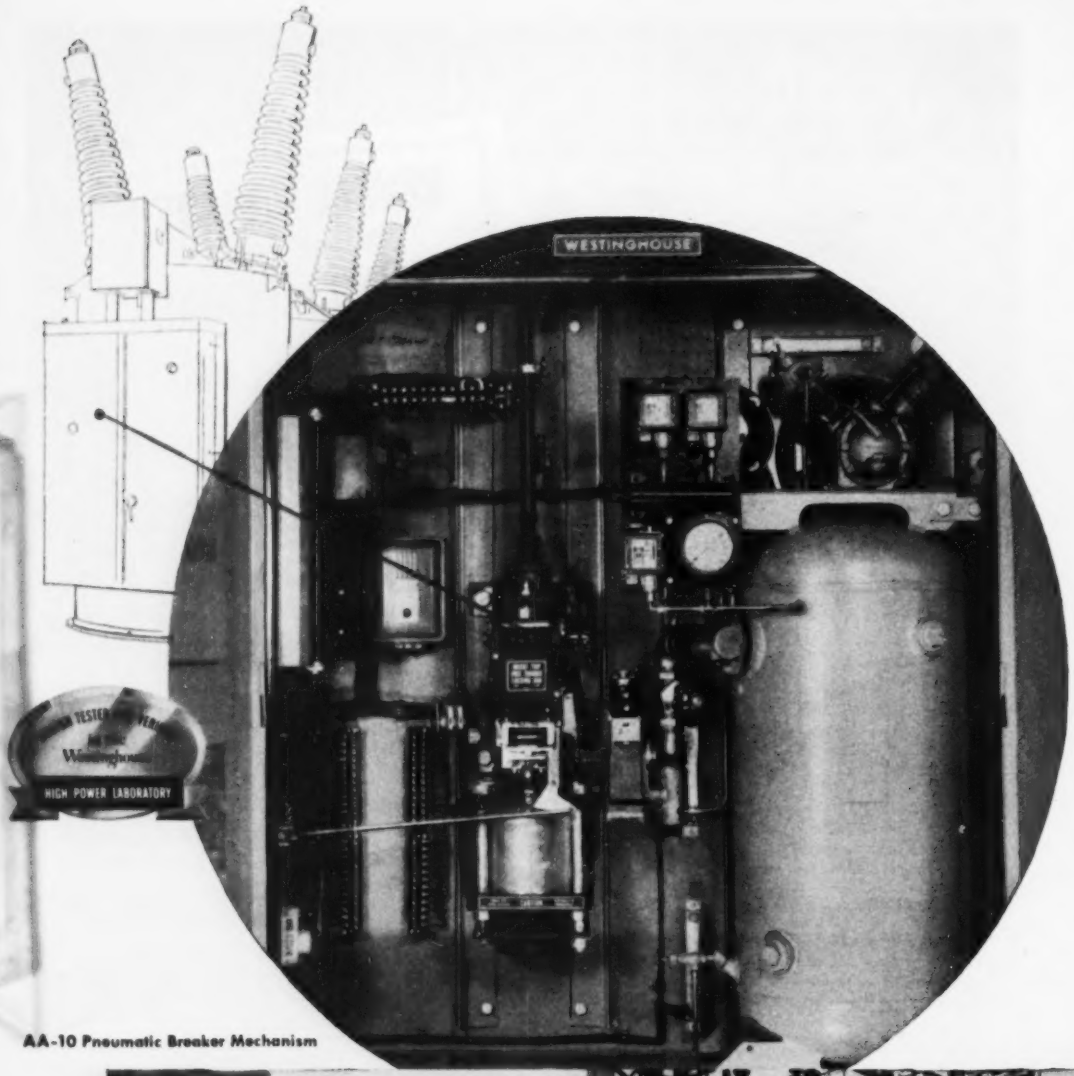
*T.M. Reg. U.S. Pat. Off.
†Patent Pending

Driver-Harris Company

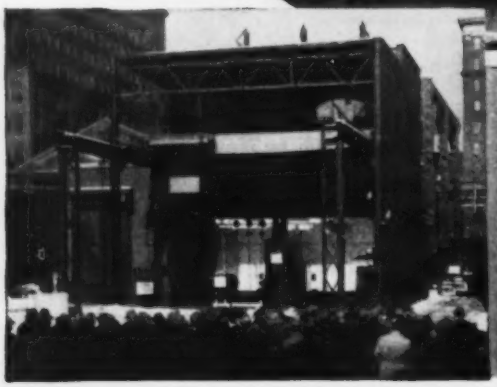
HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

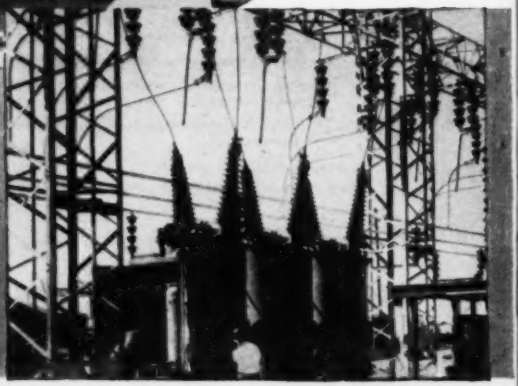
MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD



AA-10 Pneumatic Breaker Mechanism



These breaker mechanisms, like every advance in Westinghouse apparatus design, have been proved in exhaustive tests in the Westinghouse High Power Laboratory.



This 10,000,000-kva, 161-kv, 3-cycle breaker is equipped with an AA-10 pneumatic mechanism, and arranged for 20-30-30 cycle multiple reclosing.

New Breaker Operating Mechanisms Combine High Speed Reclosing...and Mechanically Trip-Free Opening

Two pneumatic operating mechanisms—the AA-7 and AA-10—now handle the complete range of Westinghouse Oil Circuit Breakers, from 15 kv, 500,000 kva to 230 kv, 15,000,000 kva. They provide new standards of operation.

THE AA-10 MECHANISM IS . . .

Larger . . . more powerful to meet the closing requirements of today's highest rated breakers.

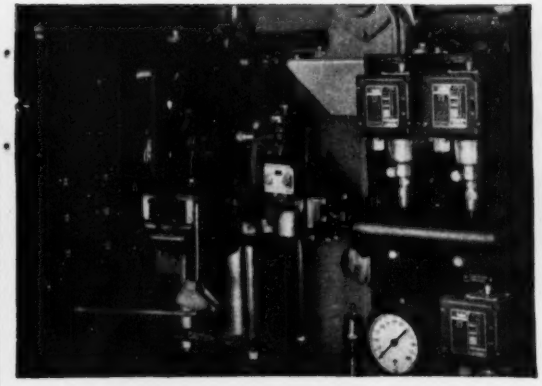
Selective . . . It trips mechanically trip-free whenever there is high-pressure air in the closing cylinder . . . contacts open unrestrained . . . never a drag from the closing piston. For high-speed reclosing, the mechanism trips non-trip-free . . . opens only part way and quickly recloses, greatly reducing stress on both the mechanism and breaker.

Unlimited Reclosing Possibilities . . . High-speed reclosing in 20 cycles, or . . . ultra-high-speed reclosing in 15 cycles or less, or . . . multiple high-speed reclosures.

THE AA-7 MECHANISM . . . Mechanically trip-free for all operations . . . meets the closing requirements of moderately loaded breakers and provides 20-cycle reclosing even after mechanically trip-free opening.

Proved Operation

Exhaustive tests in the Westinghouse High Power Laboratory and field experience on the largest breakers in service today are your assurance of perfect mechanism performance. For complete details, ask for Bulletin DB 33-125. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.



The AA-7 mechanism, like the AA-10, features roller-bearing latches, no adjustments, simplified air control, unrestricted access to all components.

See "Electrical Proving Ground"

The dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details see your Westinghouse representative, or write Westinghouse Film Division, P. O. Box 868, Pittsburgh 30, Pa. J-60782

ELECTRICAL PROVING GROUND

YOU CAN BE SURE... IF IT'S

Westinghouse

POWER CIRCUIT BREAKERS

WESTINGHOUSE

6 Reasons why you get greater accuracy with Bristol Series 500

RECORDING VOLTMETERS AND AMMETERS

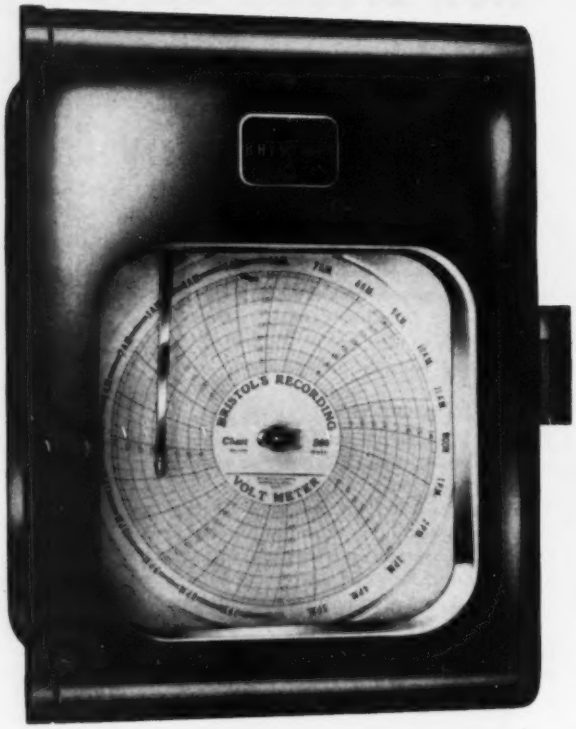
1. Low burden—the lowest burden of any round-chart recorder on the market.
2. Extremely high torque gradient.
3. Temperature compensated.
4. Shock-proof moving element mounting.
5. Leveling of instrument not critical.
6. Continuously legible recording on sudden changes—up to full scale value.

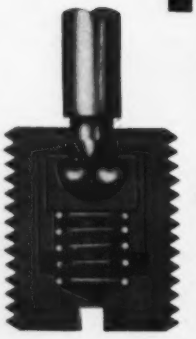
Bristol Recording Voltmeters and Ammeters use moving-iron measuring mechanisms, known for high torque . . . refined by Bristol engineers for greater accuracy and ruggedness.

Advances in electrical measurement naturally come from Bristol, experienced for nearly 60 years in building hundreds of thousands of recording voltmeters and ammeters for almost every application . . . the finest, most dependable products.

Series 500 Voltmeters and Ammeters are designed for easy use, with dust- and moisture-proof die-cast aluminum case; quick-set chart hub for easy chart changing; non-obscuring pen lifter; and snap-on chart plate.

Find out all about these superior instruments by writing for Bulletin E1111 to THE BRISTOL COMPANY, (116) Bristol Road, Waterbury 20, Conn.





Permanent mounting offered in three models: interchangeable surface and flush, surface-panel and flush panel. Note the pleasing, well-balanced appearance. Also, *portable instruments* are offered in two models: for setting on floor or table; for mounting on walls or poles and general service.

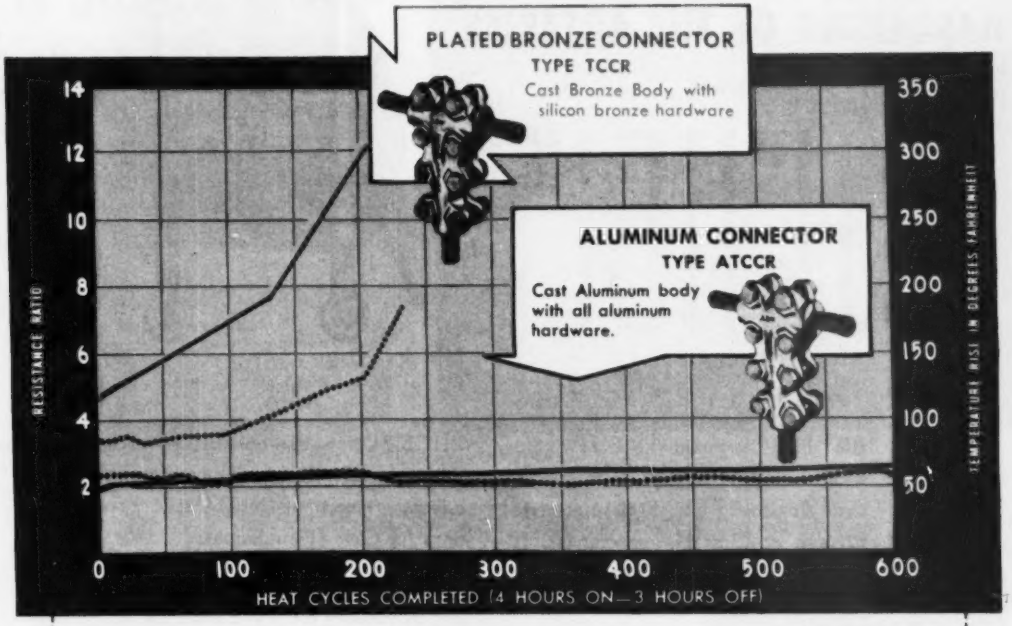
New ball-bearing suspension, loaded by a coil spring, prevents damage even under severe mechanical shock. Stainless steel bearings and shaft are almost tool hard and are corrosion-resistant.

BRISTOL

The dependable Guidepost of Industry

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

CONNECTOR FAILURES Result from the Difference in Coefficient of Expansion of Dissimilar Metals



LEGEND
PLATED BRONZE CONNECTOR
———RESISTANCE RATIO
.....TEMPERATURE RISE

HEAT CYCLE TEST ON CONNECTORS FOR 1,000,000 cm ALUMINUM CABLE

LEGEND
ALL ALUMINUM CONNECTOR
———RESISTANCE RATIO
.....TEMPERATURE RISE

RESISTANCE RATIO:

This is the ratio of the apparent contact resistance of the fitting to the resistance of a piece of 1,000,000 cm aluminum cable of the same length as the length of contact.

- CABLE—1000 MCM Insulated all aluminum 61 x 0.1280 stranding
- HEAT CYCLE CURRENT—785 Amperes
- AVERAGE AMBIENT TEMPERATURE—70° to 80° F
- AVERAGE TEMPERATURE OF CABLE ABOVE AMBIENT—66° F

Be sure to specify Cast Aluminum Connectors with Aluminum Hardware when Connecting Aluminum Conductors

Consult one of our nearest 18 representatives or contact our main office

ANDERSON BRASS WORKS, Inc.

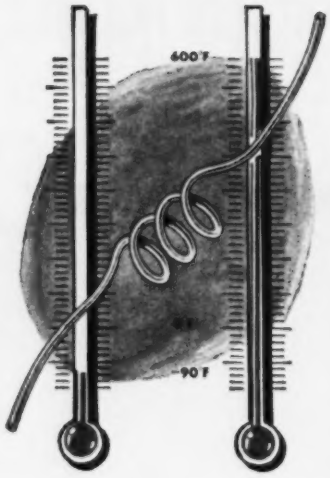
POST OFFICE DRAWER 2151

BIRMINGHAM, 1, ALABAMA

STOP ELECTRICAL HARDENING OF THE ARTERIES

WITH

BH "1151"



BH "1151" is a remarkable new electrical insulation that provides permanent flexibility and high dielectric strength at Class H temperatures. It combines braided Fiberglas and Silicone Rubber — and never grows old.

BH "1151" permits continuous operation of electrical equipment through a temperature range of –90°F. to 400° without insulation failure. 15 minutes exposure at 600°F. has no apparent effect.

BH "1151" suffers no dielectric breakdown from handling, installation or operational stresses — takes a bend. It will not crack or craze.

BH "1151" is fungus resistant — resists inorganic acids, alkalis and most organic solvents — meets all NEMA specifications for Class H insulations.

BH "1151" is the electrical insulation you are looking for if you want low to high temperature flexibility—protection from heat aging — protection against vibration failure.

BH "1151" is available in colors; in coils, 36 inch lengths, or cut to individual specifications. Send for production testing samples and data sheet now.

Address Dept. W-8

Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

BH Fiberglas* SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393330). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

Each Panelboard on this page is designed for ONE kind of job...

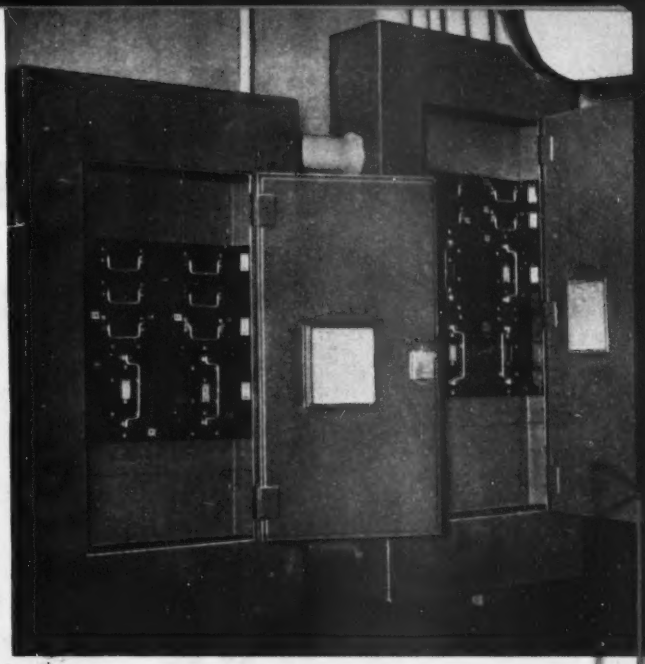
. . . the job that a "particular" kind of distribution circuit in your plant calls for.

Of course, we both know that your distribution circuits are much the same as those in other plants, but, when you come right down to it, you won't find very many electrical distribution circuits that are *exactly* the same.

To make sure you get the best panel for each application, Trumbull does two things:

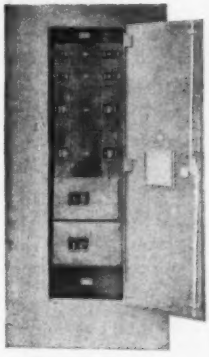
1. Supplies enough *different* types of panelboards to cover every kind of service requirement.
2. Exactly matches the special combination of requirements you set up for each panel through *standardized* construction that permits fast but *individualized* assembly of components.

"Specially assembled" panels of the types shown on this page will exactly meet any distribution panelboard requirement you now have. Others will take care of all your lighter power and lighting requirements.

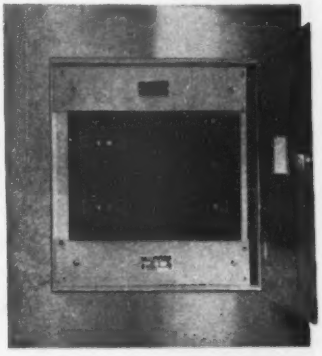


1. Two Trumbull Converti-Fuse Panelboards—the most compact distribution panelboards available. Branches: 30 to 400 amps. Service: 250 volts d-c, 600 volts a-c; single- or three-phase. Interchangeable sections and fuse clips.

2. A Trumbull Swing-Wa Panelboard—an ultra sturdy heavy-duty fusible panelboard with dead-front, hinged cover operation. Branches: 30 to 600 amps. Service: 250 volts d-c, 600 volts a-c; single- or three-phase. Circuits are convertible.



3. A Trumbull Convertible Circuit-Breaker Panelboard—versatile circuit-breaker-type assembly, *sectionalized* for maximum convertibility. Can include space for future circuits. Branches: 15-600 amps. Service: 250 volts d-c, 600 volts a-c.



4. A Trumbull ABH Circuit-Breaker Panelboard—uses same type circuit breakers as the "convertible" panel. Compactly designed to handle lighter loads. Branches: 15 to 50 amps. Service: 240 volts a-c single- or three-phase; 125/250 volts d-c.

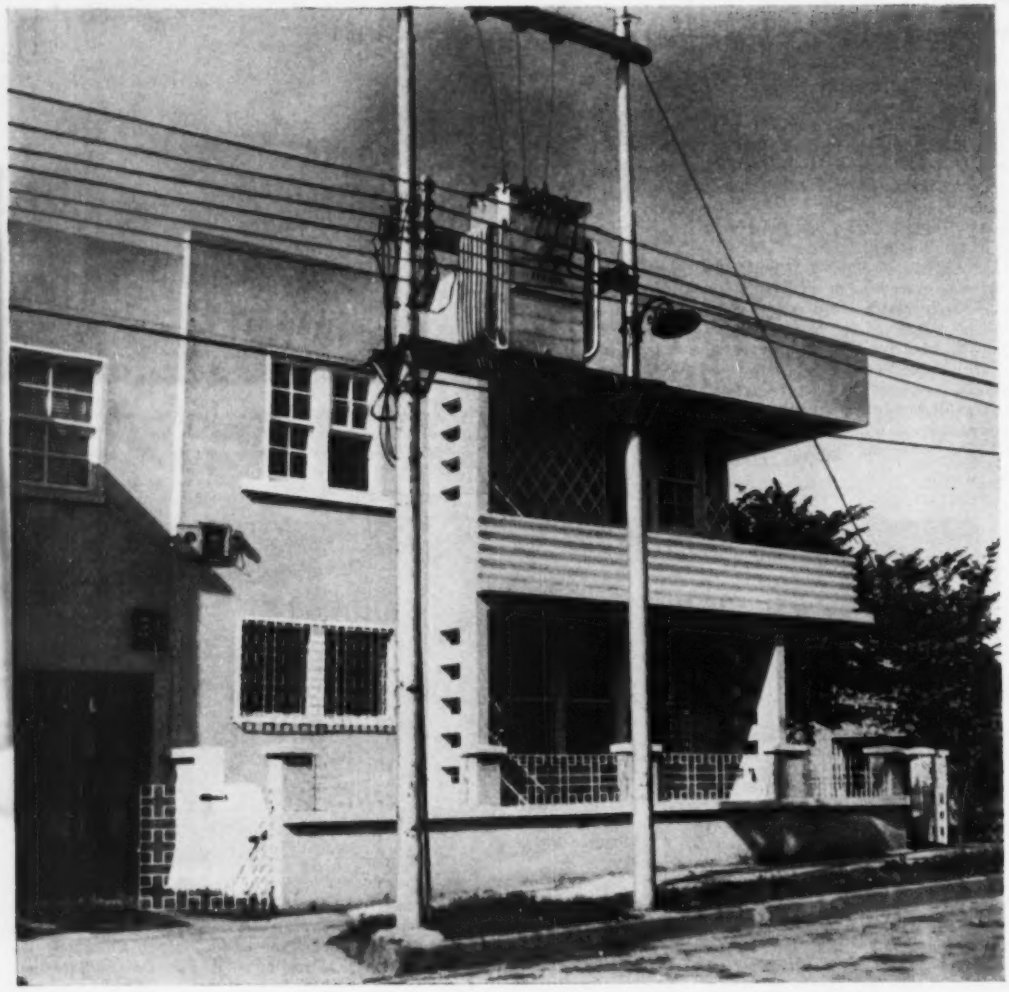
Write for bulletin or check soon with your local Trumbull distributor.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY

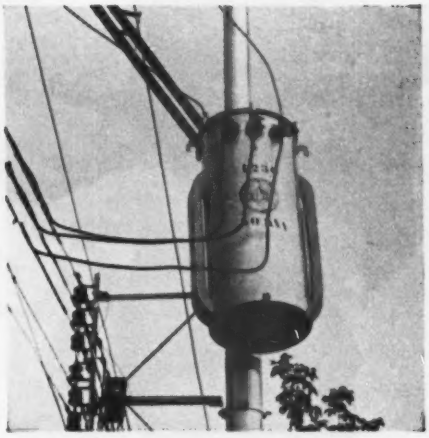
PLAINVILLE, CONN.

Wagner Transformers



Wagner Electric Corporation
EST. 1891

give dependable distribution of power in Cali Colombia

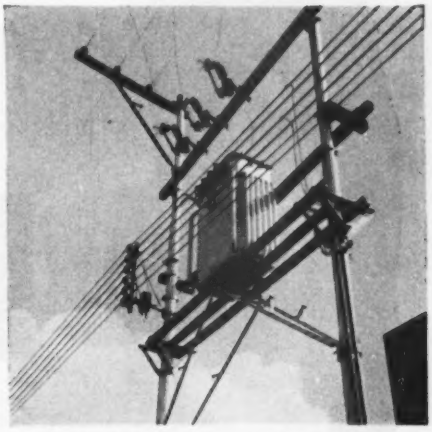


Single-phase, pole-type transformer at Cali. Thousands of these dependable Wagner transformers are in use throughout the world.

These Wagner Distribution Transformers are installed on a power company system in Colombia, South America... The unfailing dependability of Wagner transformers has long been famous throughout the world.

When you make your selection from Wagner's widely diversified line of distribution transformers —you get the benefit of improved design. All Wagner pole-type, single-phase transformers with round tanks in ratings 100 kva and below are furnished with preformed cores of cold-rolled, oriented grain steel. You get the SHUR-SEAL Cover that provides true sealed tank construction and the new Wagner tank wall mounted high voltage bushing. You get better performance... longer life... and mechanical features that are standardized in full accordance with E. E. I.—NEMA recommendations in all standard kva and voltage ratings.

Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.



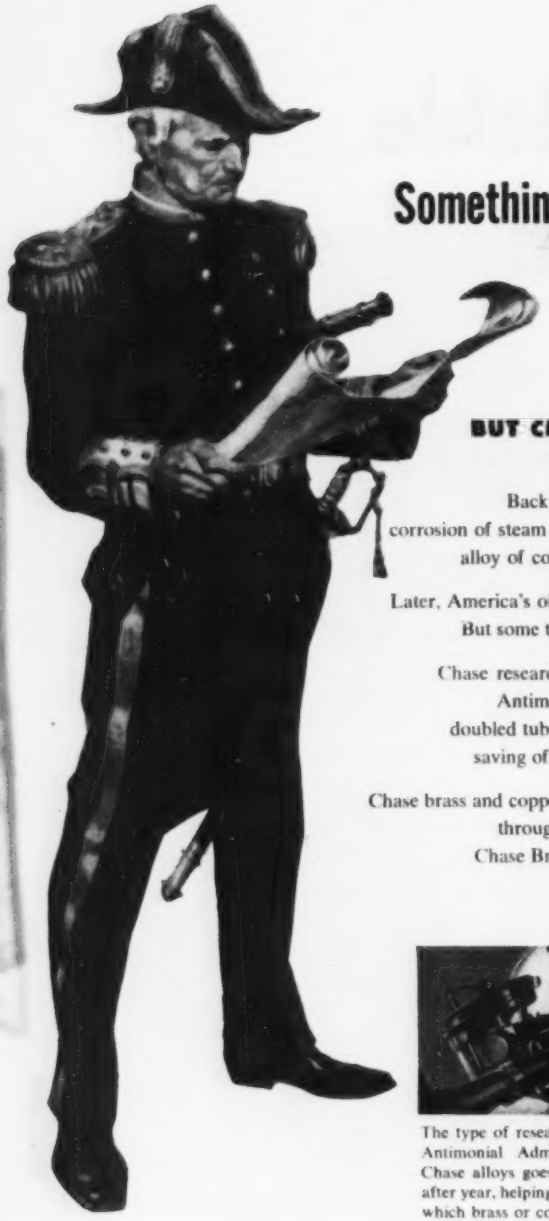
Typical three-phase, platform mounted transformer used in Cali, Colombia installation.

WAGNER ELECTRIC CORPORATION
6456 Plymouth Avenue • St. Louis 14, Mo., U. S. A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

152-14



Something the Admiral didn't know

BUT CHASE RESEARCH LATER DISCOVERED

Back in 1870, British ships were often put out of action by corrosion of steam condenser tubes. To make these tubes last longer, an alloy of copper, zinc and tin called "admiralty" was developed.

Later, America's oil industry used "admiralty" tubes in heat exchangers. But some types of water caused zinc to separate from the copper.

Chase research metallurgists then developed a new alloy — Chase Antimonial Admiralty* which in many instances more than doubled tube life. Alloys of this type have resulted in an estimated saving of $3½ million a year for the petroleum industry alone.

Chase brass and copper alloys are available, subject to government controls, through jobbers and Chase's 23 convenient mill warehouses. Chase Brass & Copper Co., Incorporated, Waterbury 20, Conn.

U. S. Pat. No. 2,061,921

The type of research that developed Antimonial Admiralty* and other Chase alloys goes on at Chase year after year, helping industry determine which brass or copper alloy is suited to each industrial need.

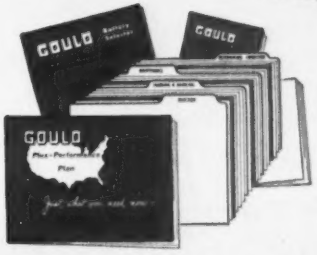
Telnic® Bronze, another Chase development, makes better aircraft instrument parts, radar tubes and other electronic equipment. It was "tailor-made" for industry by Chase research metallurgists.

Chase *The Nation's Headquarters for* **BRASS & COPPER**

Chase Brass & Copper Co. is a subsidiary of KENNECOTT COPPER CORPORATION

CHASE BRASS & COPPER CO., WATERBURY 20, CONN. Warehouses and Sales Offices at — Albany† Atlanta Baltimore Boston Chicago Cincinnati Cleveland Dallas Denver† Detroit Houston† Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester† St. Louis San Francisco Seattle Waterbury (†sales office only)

It's pretty satisfying to look at the bank of standby batteries in your battery room and know they're brim full of power . . . ready for any emergency today or tomorrow. That's the beauty of Gould Planté . . . they last practically forever because positive plates are made of *pure lead*. They contain *no* antimony to contaminate negative plates and shorten service life. To be certain of standby power *always* on tap . . . choose Planté— the "Aristocrat of Stationary Batteries."

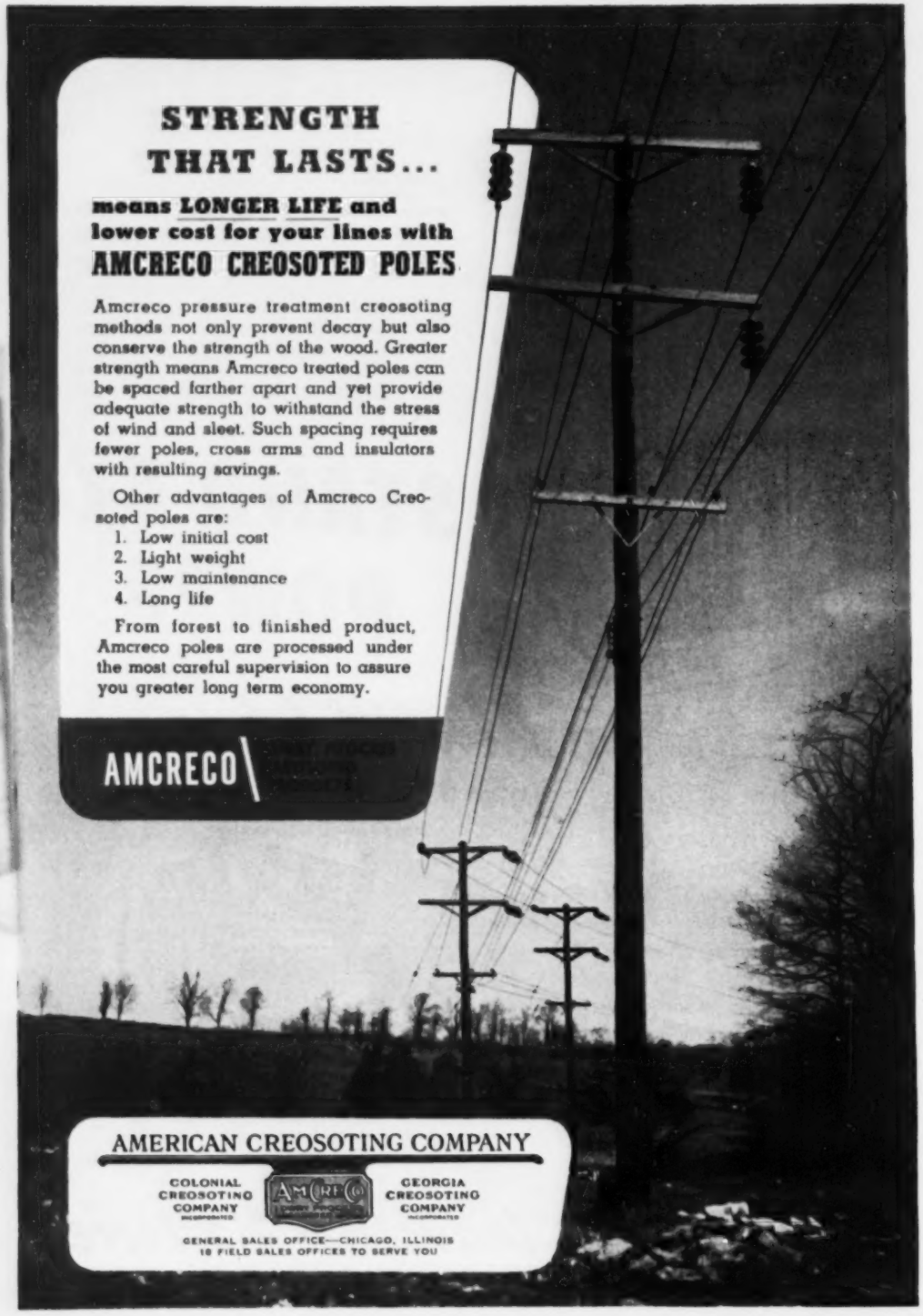


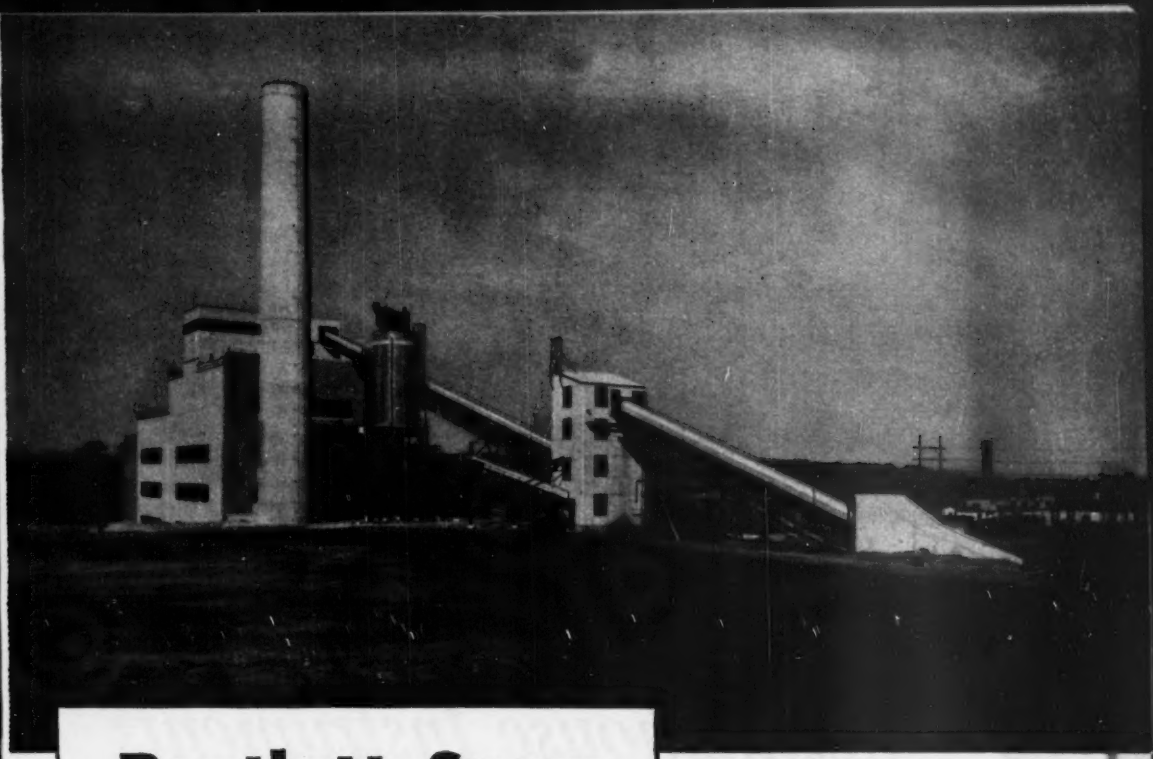
You may be able to save up to 50% on maintenance costs throughout the life of your stationary batteries through the use of the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full details.

GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries


STRENGTH
THAT LASTS...
means LONGER LIFE and
lower cost for your lines with
AMCRECO CREOSOTED POLES
Amcreco pressure treatment creosoting methods not only prevent decay but also conserve the strength of the wood. Greater strength means Amcreco treated poles can be spaced farther apart and yet provide adequate strength to withstand the stress of wind and sleet. Such spacing requires fewer poles, cross arms and insulators with resulting savings.
Other advantages of Amcreco Creosoted poles are:
1. Low initial cost
2. Light weight
3. Low maintenance
4. Long life
From forest to finished product, Amcreco poles are processed under the most careful supervision to assure you greater long term economy.
AMCRECO
AMERICAN CREOSOTING COMPANY
COLONIAL CREOSOTING COMPANY
GEORGIA CREOSOTING COMPANY
GENERAL SALES OFFICE—CHICAGO, ILLINOIS
10 FIELD SALES OFFICES TO SERVE YOU

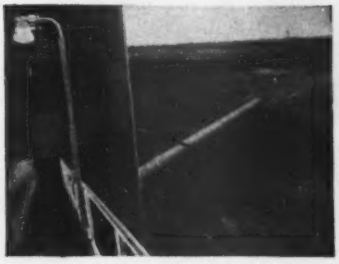


General View—Saybrooke Station
Central Illinois Elec. & Gas Co.
Stone and Webster Eng. Corp.
Consulting Engineers

Bartlett-Snow coal handling at Rockford

● The illustration above shows the first 30,000 KW unit of a plant which is to be extended into a 110,000 KW station. All coal handling equipment including track hopper and grill, duplex feeder, conveyors, galleries, chutes, tripper and all supporting structures were fabricated in our shops, and installed by us, to Stone and Webster's plans. For efficiency, satisfaction, and fixed unit responsibility, let the Bartlett-Snow coal handling engineers, with their long experience and complete facilities work with you on your next job.

Belt Conveyor from
Track Hopper to Crusher House



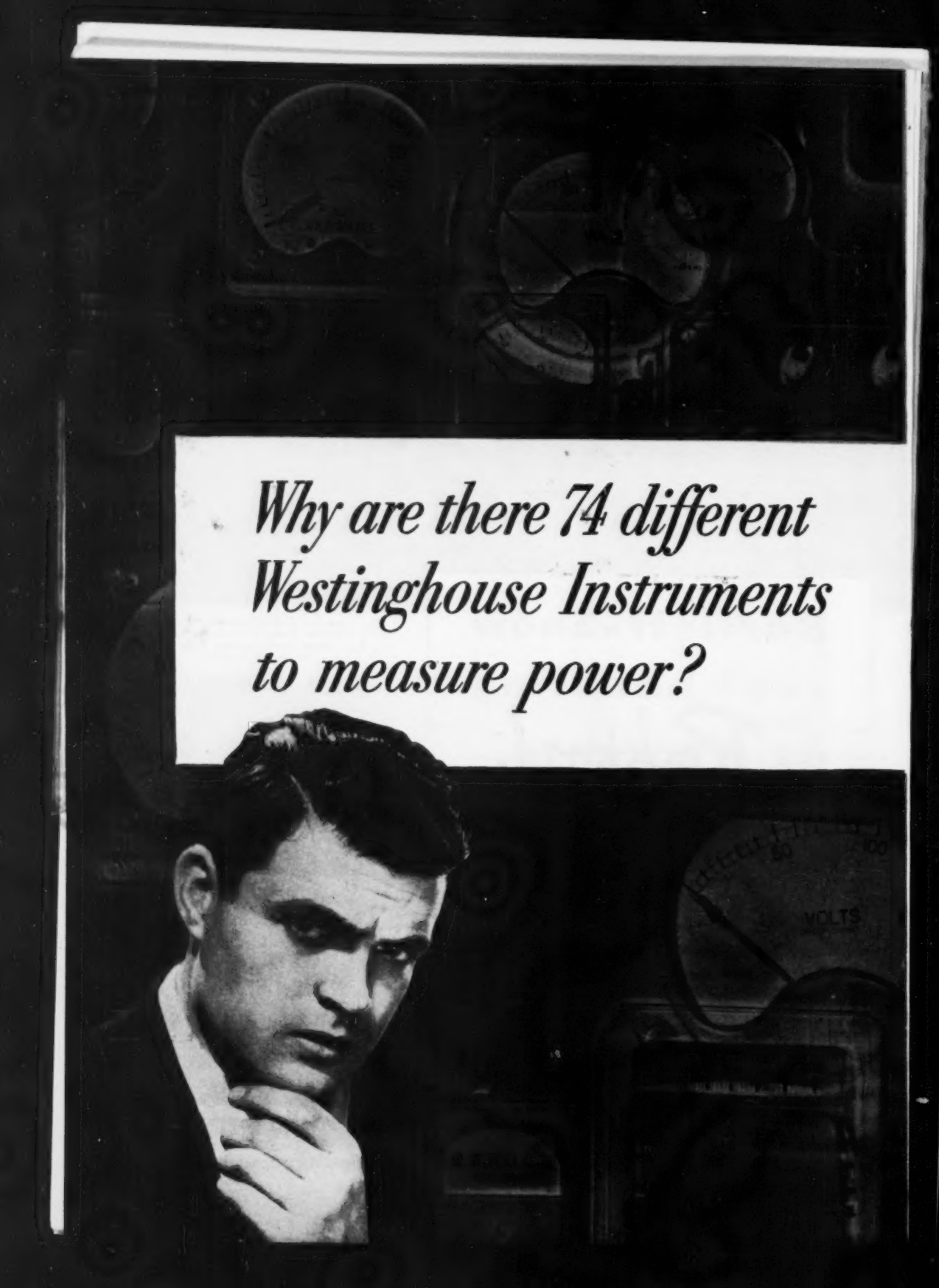
View of Crusher House and
Stacking Out Conveyor

DESIGNERS
ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS
ERECTORS

"Builders of Equipment for People You Know"


Why are there 74 different
Westinghouse Instruments
to measure power?
VOLTS

If you produce a product

The wider choice you get in Westinghouse Instruments offers you new opportunities to improve your product's performance, appearance, salability. Whether you want to measure amperes, volts, watts, vars, power factor, frequency or synchronism, there's a Westinghouse Instrument to meet the precise requirements of your customers. And the performance of *all* Westinghouse Instruments meet ASA Standards.

pilot a plant

If your job is supervision of production or plant operation, getting just the *right* instrument can help you gain closer control of a process or more efficient operation of plant facilities. Moreover, Westinghouse offers you competent application assistance to help you employ instruments most effectively.

or probe the unknown

If your job is research, this complete line of instruments serves all your needs for the measurement of electrical values. The diversity of types, for any given measurement, includes many variations in size, types or mounting, types of scale, range, accuracy and styling, as well as instruments to measure position, time, temperature and speed.

you gain benefits like this:

Take the case of a leading electronic equipment manufacturer. They needed to equip tube test stations with a variety of instruments having co-ordinated styling for best appearance; small enough to permit close grouping and accurate enough to serve as "standards". Standard Westinghouse Instruments answered every requirement! Next time *you* need instruments to improve a product, perfect a process or probe a problem . . . specify Westinghouse!

J-40419

For complete information **about Westinghouse Instruments, write for Booklet B-4696. Address: Westinghouse Electric Corporation P. O. Box 868, Pittsburgh 30, Pennsylvania.**

YOU CAN BE **SURE**... IF IT'S

Westinghouse

INSTRUMENTS

NEW CURTIS "EYE COMFORT" 5000 SERIES

LUMINOUS INDIRECT FLUORESCENT LUMINAIRES

Curtis "Tong Hangers"* allow unlimited flexibility in placement of hangers and keep installation cost at a minimum.
*Pat. Applied For

Catalog Number	No. and Type of Lamps
5002	Two, 96", T-12, 72W Slimline
5003	Two, 48", T-12, 40W Bi-Pin Instant Start
5004	Two, 48", T-12, 36W Slimline
5005	Two, 60", T-17, 85W Bi-Pin Starter Type
5007	Two, 48", T-12, 40W Bi-Pin Starter Type
5008*	Four, 48", T-12, 40W Bi-Pin Starter Type
5009*	Four, 48", T-12, 40W Bi-Pin Instant Start
5010*	Four, 60", T-17, 85W Bi-Pin Starter Type

*Two Lamps Parallel.

APPROPRIATE BRIGHTNESS CONTROL

... quality lighting with comfortable brightness ratios providing ...

EYE COMFORT

... in seeing by scientific shielding, diffusing and distribution of the lamp light through .

LOW BRIGHTNESS

... illumination that gives you lighting comparable to diffused daylight.

The new luminous indirect "Five Thousand" Series has Curtis quality construction and workmanship throughout ... with wire channel constructed of heavy gauge steel finished baked white "Fluracite" enamel. Side panels are fine ribbed lurable polystyrene plastic to softly diffuse the light and provide low-brightness ratios between the ceiling and luminaire. Curtis "Five-Thousand" Series luminaires are available to accommodate all 4', 5' and 8' fluorescent lamps. Write for descriptive literature.

CURTIS LIGHTING, INC.

Dept. H17-20
6135 W. 65th Street,
Chicago 38, Illinois

MAGNET WIRE

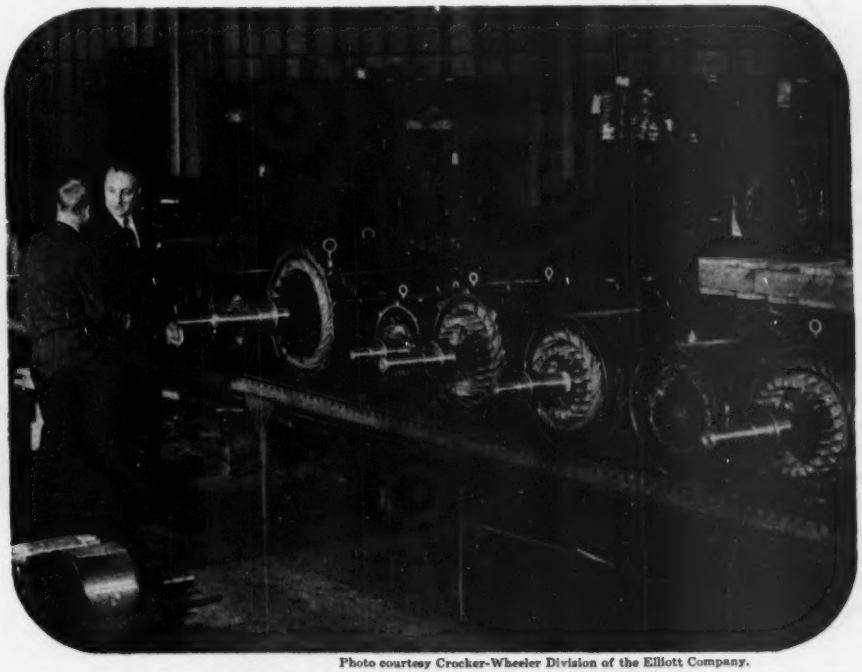


Photo courtesy Crocker-Wheeler Division of the Elliott Company.

Roevar . . . you can't buy a finer magnet wire

CONTINUAL IMPROVEMENT is a distinguishing feature of Roebling's electrical wire and cable line. And to make Roebling Roevar Magnet Wire today's A-1 specification for high speed winding, we use the toughest insulation we know of.

This Roevar insulation is *many times* more abrasion-resistant than conventional enamels. It is highly resilient . . . bends to a remarkable degree without cracking or coming loose from the conductor. On top of that, it has extra resistance to the solvents that are used in coil-treating varnishes and to all usual baking temperatures.

Roevar Magnet Wire comes in sizes No. 14 to 40 A.W.G. . . . and its small diameter is an important factor in many applications. You can depend on us for the best deliveries possible under today's conditions. John A. Roebling's Sons Company, Trenton 2, N. J.

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 701 ST. CLAIR AVE., N. E. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • PITTSBURG 1301 CLARK BLDG • SAN FRANCISCO, 1740, 17TH ST • SEATTLE, 900 1ST AVE S. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

How Motorola 2-Way Radio *pays for itself* in Savings!

MORE AND MORE ELECTRIC COMPANIES ARE IMPROVING CUSTOMER SERVICE—SAVING MONEY DOING IT!

In any fast moving operation that takes swift, surely accurate timing of all crews and equipment, look to Motorola 2-way Radio as step one in promoting extra efficiency, economy and new operational profit!

As an investment, too, Motorola puts first emphasis on *your profit interests.* This equipment is Motorola-engineered throughout to give you top performance at lowest operating expense. It also gives you the protected value of obsolescence-proof equipment that stays up-to-date for years to come.

Driver of an electric utility company cable truck takes a radio call from his office dispatcher. No wasted time . . . no waiting for instructions!

Substation department dispatcher takes call through this Motorola console, keeping in touch with all the men on the road . . . instantly!

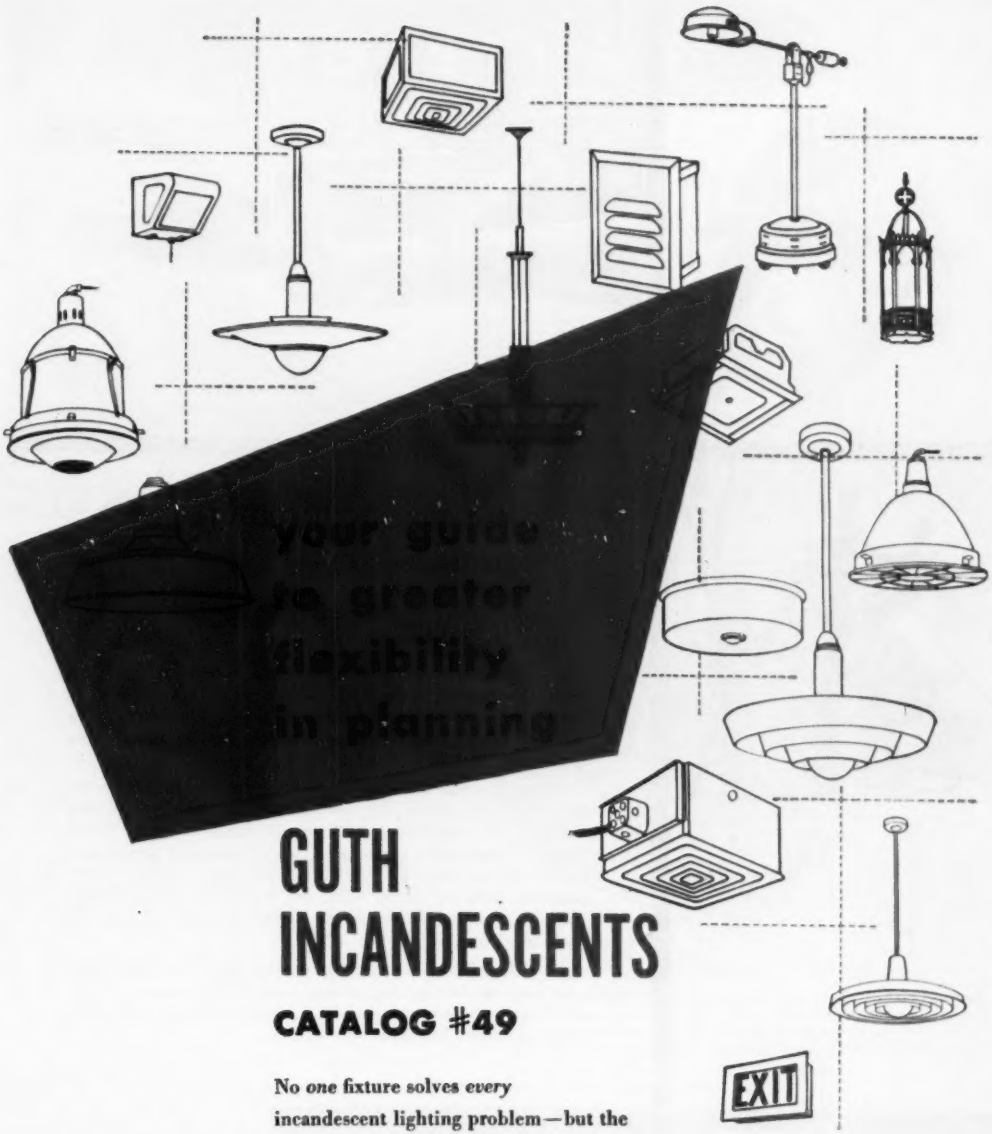
Just one of many Motorola advantages!

Exclusive Motorola Sensicon Permakay filter keeps your radio sets permanently "on the beam" . . . ends costly tuning adjustments forever!

Motorola

Communications & Electronics Division
4445 Augusta Blvd., Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada

Photos courtesy of the Detroit Edison Company



GUTH INCANDESCENTS

CATALOG #49

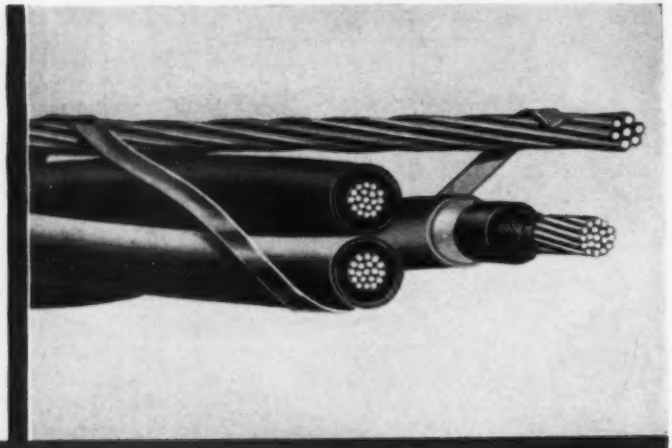
No *one* fixture solves *every* incandescent lighting problem—but the complete GUTH Line does!

May we send you a copy?

IT'S FREE!

19 Guth 52

THE EDWIN F. GUTH CO. / ST. LOUIS 3, MO.



Durable neoprene jacket protects aerial cable . . . assures long service

Today, neoprene-jacketed, self-supporting aerial cable is first choice for primary distribution lines. Neoprene's outstanding resistance to deterioration from sunlight, weathering, and abrasion means maximum protection to insulation . . . long service without failure.

In rural, residential, and industrial areas alike, neoprene-jacketed aerial cables have continued to operate despite long exposure to conditions which would normally cause "outages". . . such as the corrosive action of industrial smoke and fumes and abrasion by tree limbs. Ask your supplier about neoprene-jacketed aerial cable. It's available pre-assembled with built-in messenger or in individual cable lengths for "spinning" on the job.

Send for "The Neoprene Notebook." Each issue describes new, unusual applications of neoprene. Write today to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div., Wilmington 98, Delaware.

NEOPRENE

DU PONT

150th Anniversary

Tune in Du Pont "Cavalcade of America"—Tuesday evenings, NBC—coast to coast

MOISTURE

but it's never too wet for

*BI-SEAL SELF-BONDING INSULATING TAPE

Two-way moisture protection is assured with Bi-Seal Self-Bonding Electrical Insulating Tape. Not only is Bi-Seal itself non-hygroscopic, but its self-bonding property—which fuses the tape layers into a solid mass—plus its unique constricting action, positively prevent any lateral moisture penetration.

Bi-Seal is a tested and proven multi-purpose electrical insulating tape that gives permanent protection on any wire or cable splice against acids, alkalies, sunlight, corrosion, ozone and fungus, as well as moisture. It has an average dielectric strength of over 1000 volts per mil and performs efficiently on any type of insulation. Bi-Seal will not deteriorate or deform in storage and its low temperature characteristics are outstanding. Send for full details today!

OTHER ADVANTAGES OF BI-SEAL

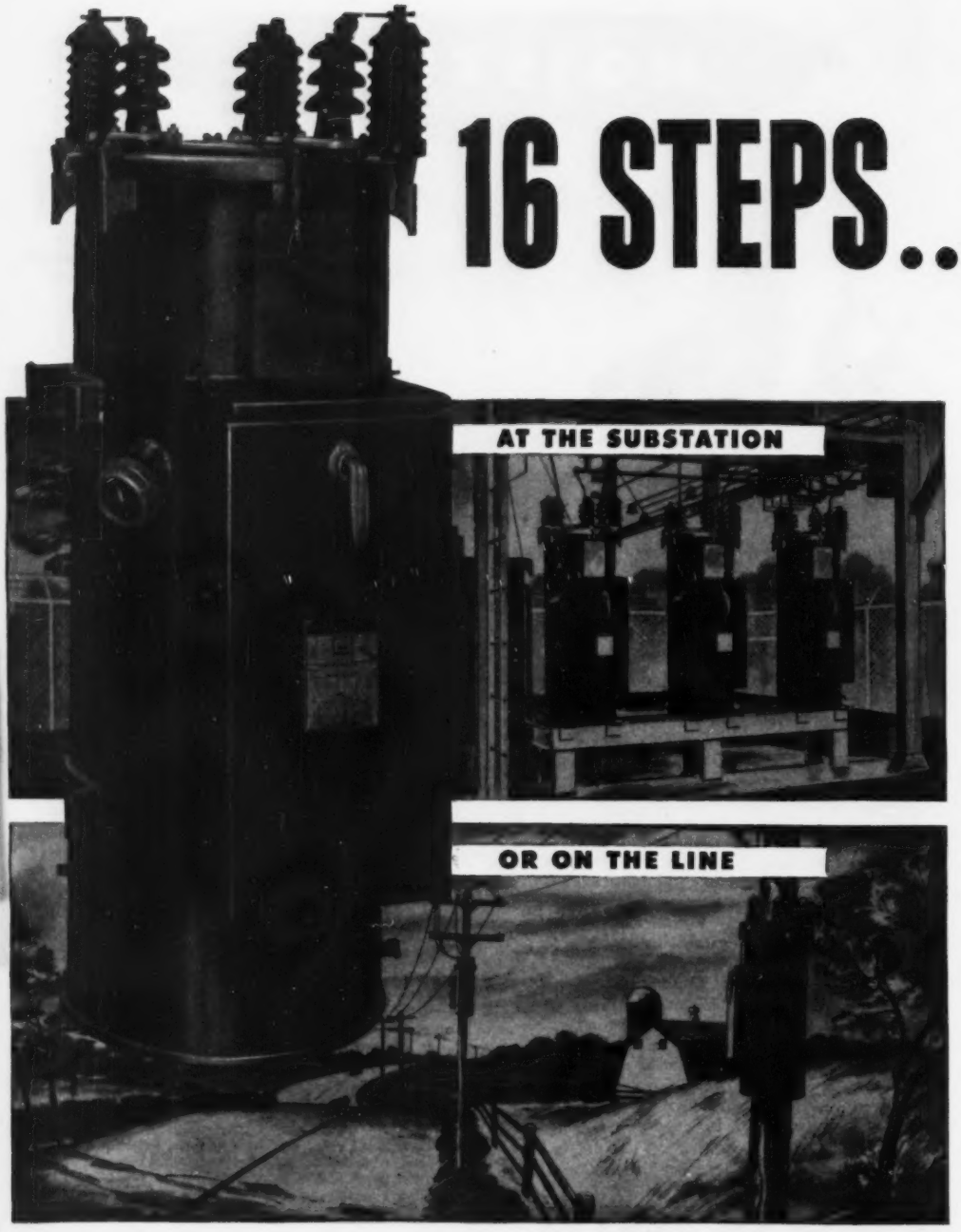
- NO STICKY ADHESIVES . . . EASIER TO APPLY IN CLOSE CLEARANCES
- NO RIGHT OR WRONG SIDE . . . BOTH SIDES USABLE
- NO TACKY SURFACE TO PICK UP DUST OR FOREIGN MATTER
- WILL NOT TANGLE OR STICK TOGETHER DURING APPLICATION
- REQUIRES NO SPECIAL APPLICATION TECHNIQUES
- CAN BE STORED INDEFINITELY

* POLYETHYLENE BASED COMPOUND
PAT. NO. 2569540. REG. TRADE MARK

APPLIES FAST · STAYS FAST
BI-SEAL
BISHOP
MANUFACTURING CORPORATION
CEDAR GROVE, NEW JERSEY

Attach this coupon to your company letterhead and mail to: **Bishop Manufacturing Corporation, Dept. EW Cedar Grove, N. J.**
Please send sample and complete information on Bi-Seal to:

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____


16 STEPS...
AT THE SUBSTATION
OR ON THE LINE

Close Regulation, Reliable Operation ...at the *LOWEST COST!*

Check these Westinghouse Voltage Regulator advantages. Compare them. The Westinghouse URL-16 with 16, 1¼ steps provides:

★ Low maintenance cost . . . made possible with a minimum number of tap-changer operations and a minimum number of contacts and moving parts.

★ Voltage regulation within ± 1-volt band width.

Only the Westinghouse URL-16 has these features:

1. Complete surge protection with "De-ion®" arresters on each line bushing.
2. Direct Geneva Drive Mechanism has controlled contact speed for long contact life, minimum maintenance.
3. Package control in one Flexitest® unit for maximum flexibility and interchangeability.
4. Simplified control has voltage regulating relay with integral inverse time delay.

IMPROVED CONTROL CABINET . . . Control cabinet door is hinged at bottom to provide a "workbench" when in open position. Control cabinet may be mounted integrally with the regulator or on the pole below the regulator.

FOR FURTHER INFORMATION on the new URL-16 Regulator, call your Westinghouse representative, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-70631

Westinghouse URL-16 Voltage Regulator—easy to install, easy to maintain, . . . engineered for every condition of weather . . . every condition of service.

YOU CAN BE SURE... IF IT'S

Westinghouse

VOLTAGE REGULATORS

New G-E Radio System in tough mountain terrain

CUTS SERVICE COSTS 50%

Radio links utility offices and power plants over 10,000 square mile area despite elevations up to 7,000 feet.

HIGH TENSION transmission lines in the South Dakota mountains presented difficult maintenance problems to the Black Hills Power and Light Company at Rapid City. Snow and high winds made land line communication impractical. General Electric's CAS* engineers solved the problem and cut the cost of the whole operation in half.

Today, 2-way radio carries voice messages instantly throughout the system. Ten General Electric land stations and 28 mobile radio sets in cars, service trucks, line trucks and power wagons, keep communications open 24 hours a day the year 'round.

The CAS* Man at the G-E office near you is a specialist in communication problems. His information and help are as near as your telephone. *General Electric Company, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

Elevation 6800 feet. Terry Peak installation has General Electric control transmitter-receiver combination and 250-watt central station unit.

69 kilovolt structure is inspected by lineman on pole while Henry Ostreich, superintendent of construction, talks to headquarters by car radio.

G-E 50-watt unit in Osage power plant. Ed Geddes, chief engineer, places call to truck in motion 55 miles away via mountain-top relay.

Power plant control console links mountain transmitters with main station and office units. Utility plans to add more G-E radio as load grows.

Complete Communication Systems for Industry

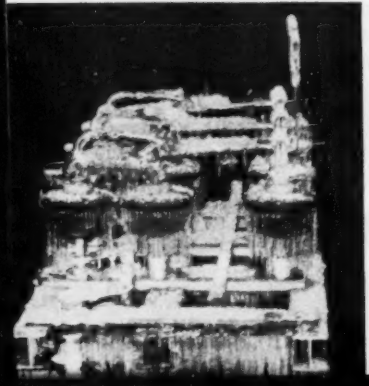
GENERAL ELECTRIC

IN TIME OF HEAT-

PREPARE FOR COLD!

NOW, OR ANYTIME is the right time to think of winter - - and the advantages of R&IE Switches

Exhaustive research and testing has provided R&IE engineers with a thorough knowledge of ice conditions, slow freezing, freeze-melt-freeze, thin and thick coatings - all have been studied. Write for information and test records.



CHECK THE FACTS on Type TTR49

1. Only one exposed make-and-break contact—why have two, and double the operating efforts at the contacts.
2. Blade rotates, releasing contact,—breaking ice before it starts vertical travel to open gap—with continuous operating motion.
3. Liberal clearances, and small radii in shear, contribute to easy operation and ice breaking ability.
4. Progressive motion of all operating parts, means that ice is cracked at a succession of points and the resistance to operation is distributed—not concentrated.
5. All mechanical parts have adequate strength to permit maximum operating force for ice breaking.

●

R&IE EQUIPMENT DIVISION
I-T-E- Circuit Breaker Co.
GREENSBURG, PA.

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES
INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

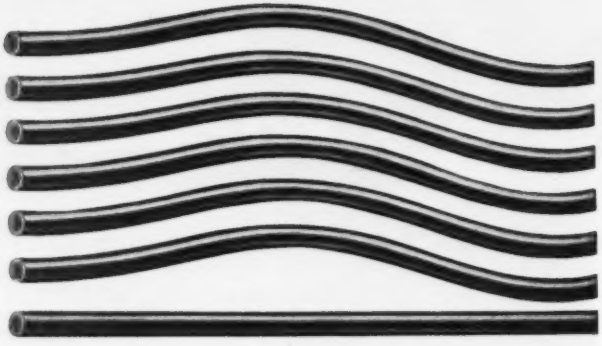
METAL CUBICLES

TESTING DEVICES

Here's the strand . . . Bethlehem Form-Set . . . that doesn't need seizing. Cut it, use it; no time-wasting preliminaries. Smooth, clean ends after the cut has been made—ends that go into a fitting as easily as a pencil would.

You can cut a piece of Form-Set at any point, and none of its wires will pop out of place. The reason is that each curved wire is preformed before being laid around the core wire. That's what Form-Set means—preformed. The preforming process gives the wires a permanent curl that largely nullifies internal tension, keeps the wires from "bushing out" when cut.

This is a feature that any lineman is bound to find helpful. He doesn't have to seize the strand, and there's no handling problem, none at all, when he inserts those neat, trim ends into his fittings.



Components of seven-wire Form-Set strand. The core wire is uncurved; the other six have a permanent helix that cannot straighten out, even when the strand is taken apart.

All five grades of Bethlehem strand (common, siemens-martin, high-strength, extra-high-strength, and utilities) can be obtained with the Form-Set construction. Why not let us tell you the full story? It will be time well spent.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

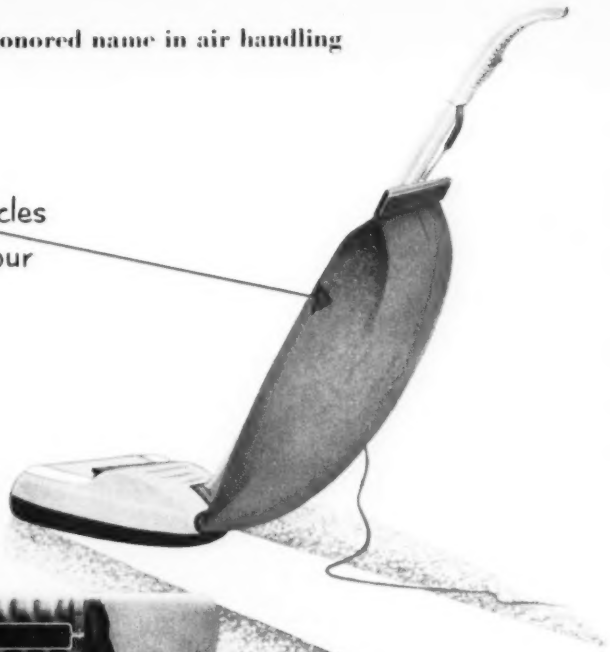
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

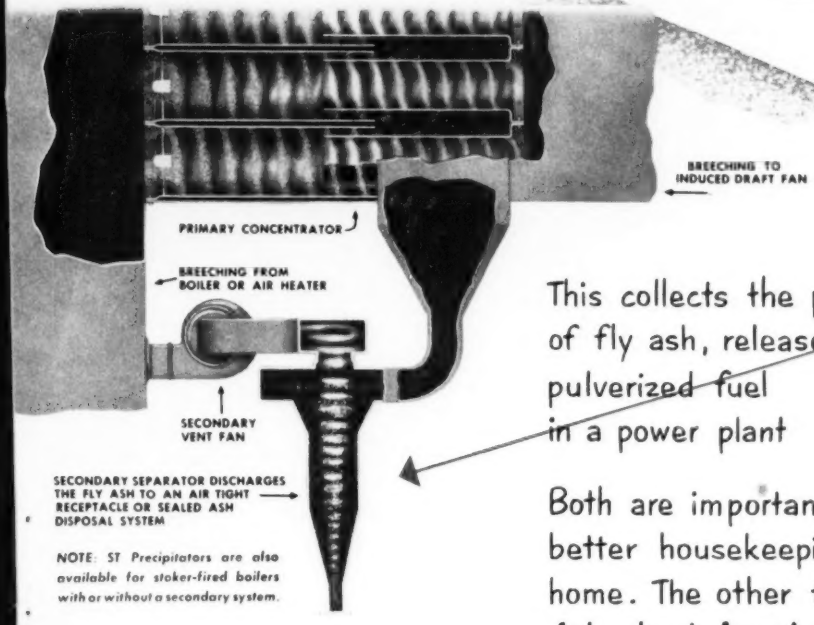
Bethlehem *FORM-SET* Strand

BETHLEHEM STEEL

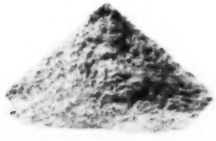
American Blower . . . a time-honored name in air handling

This collects the particles of dust from air in your vacuum cleaner




BREECHING TO INDUCED DRAFT FAN
PRIMARY CONCENTRATOR
BREECHING FROM BOILER OR AIR HEATER
SECONDARY VENT FAN
SECONDARY SEPARATOR DISCHARGES THE FLY ASH TO AN AIR TIGHT RECEPTACLE OR SEALED ASH DISPOSAL SYSTEM

NOTE: ST Precipitators are also available for stoker-fired boilers with or without a secondary system.



This collects the particles of fly ash, released by burning pulverized fuel in a power plant

Both are important tools in better housekeeping. One for the home. The other for the community. Ask about American Blower Type ST Fly Ash Precipitator, *now!*

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • ACME CABINETS • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

For information concerning American Blower or Canadian Sirocco power plant equipment, please call the nearest Branch Office or Sales Representative. They are strategically located for your convenience in the cities listed below.

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Serving home and industry

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WHEN IT COMES TO
ELECTRICAL CONTACT ASSEMBLIES . . .

MALLORY
Has What It Takes
to do the whole job for you

There are three reasons why you get unequalled contact assembly performance when you put Mallory assembly engineering to work for you.

Mallory *facilities* are unexcelled. Mallory *personnel* is unequalled, both from the standpoint of training and practical achievement. And Mallory *experience* is invaluable—covering development of exclusive new alloys . . . designs . . . fabricating and finishing methods . . . brazing techniques.

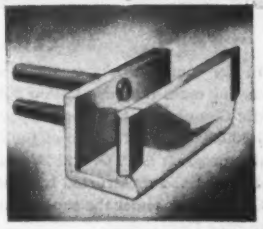
They add up to three-way savings for you—in better contact assembly performance . . . reduced costs . . . and relief from the problems of handling, scheduling and divided responsibility involved in assembling your own contact units.

Take advantage of Mallory engineering to get better contact assemblies at lower cost by turning over the *whole* job to Mallory—from design and material selection . . . to fabrication and finishing of parts . . . to final assembly.

EXPECT MORE . . . GET MORE FROM MALLORY

A contact assembly for use in an oil-immersed transformer tap changer presented typical problems. It required a backing material capable of handling heavy electrical loads and with properties to permit practical blanking and forming as well as a smooth finish for a high quality braze. Contacts had to withstand heavy arcing and severe mechanical impact.

Mallory assembly engineering solved the problems by using Mallory Elkonite® for contacts . . . a special Mallory alloy for backing . . . Mallory brazing and production techniques. And turned out an assembly that has exceeded performance expectations . . . at a reasonable cost. Mallory can do the same for you.



In Canada, made and sold by Johnson Matthey & Mallory Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P.R. MALLORY & CO. Inc.
MALLORY

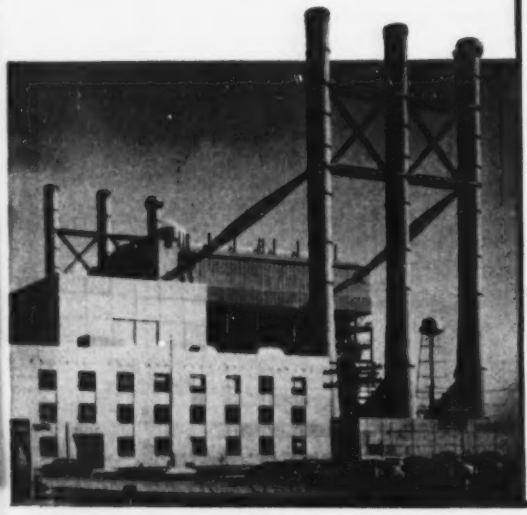
SERVING INDUSTRY WITH
Electromechanical Products—Resistors • Switches • TV Tuners • Vibrators
Electrochemical Products—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical Products—Contacts • Special Metals • Welding Materials

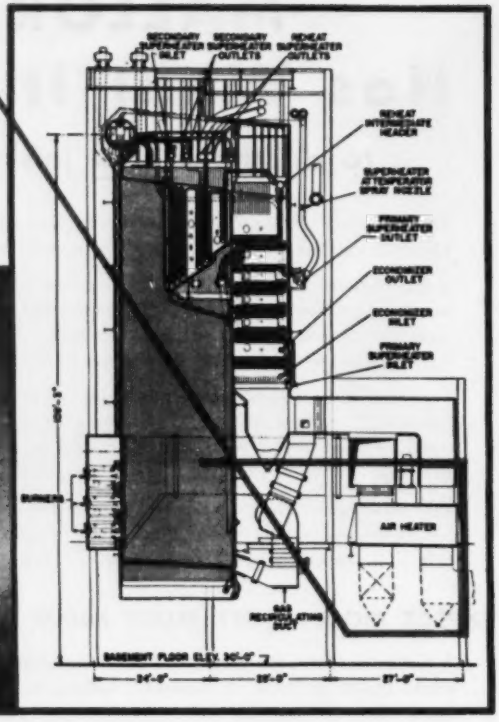
P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

All Boilers at Moss Landing Steam Plant of the Pacific Gas and Electric Company

equipped with

LJUNGSTROM AIR PREHEATERS





In the country's largest single utility expansion program, costing more than one billion dollars, Pacific Gas and Electric Company is boosting its power capacity by more than 2,500,000 kilowatts. One of the five steam power plants in this program is P. G. and E.'s Moss Landing Steam Plant, designed and constructed by Stone & Webster Engineering Corporation, under the supervision of the P. G. and E. Engineering Department.

Three of a projected five 100,000-kw turbines are in operation now at Moss Landing. Steam for each of these three turbines is supplied by two 475,000 pounds of steam per hour Babcock & Wilcox Radiant Boilers with superheater outlet conditions of 1405 psi and 950 F. The two turbines yet to be installed will each be powered by one B&W reheat boiler (illustrated), designed to generate 850,000 lb of steam per hr at 1450 psi and 1000 F, reheated to 1000 F.

Each of the boilers at Moss Landing has been designed to incorporate a Ljungstrom Air Preheater. Those now in use preheat incoming air to 575 F, and cool exit gases to 350 F. Ljungstroms will be used also for the boilers being built.

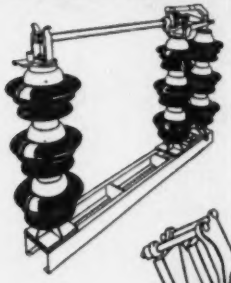
Moss Landing is another in a long series of new stations and expansions to existing stations where Ljungstrom Air Preheaters have been specified for high-performance steam generating units. The unanimity with which the Ljungstrom has been accepted by boiler manufacturers, consulting engineers, and power companies is demonstrated by the fact that over 285,000,000 pounds per hour of steam capacity since 1945 has been served by Ljungstrom Air Preheaters.

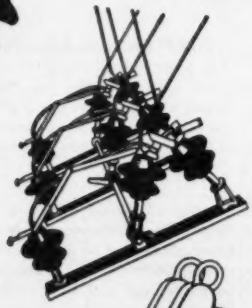
THE Air Preheater Corporation 60 East 42nd St., New York 17, N.Y.

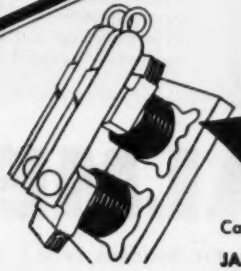
FOR DEPENDABLE TROUBLE-FREE PERFORMANCE

ELPECO

POWER SWITCHING EQUIPMENT







For over 40 years the Elpeco line of high-quality power switching equipment has been known for its outstandingly dependable and trouble-free performance. Constant research and redesign have enabled Elpeco to *anticipate* rather than meet the ever changing demands and requirements of the electrical industry. Particular buyers, who have specified Elpeco products over the years, know that when they buy Elpeco Indoor and Outdoor Disconnect Switches, Air Break Switches, Indoor and Outdoor Bus Supports, Bus Ducts and Substations . . . they are getting the finest, most modern equipment on the market. All Elpeco products conform to NEMA and AIEE standards for performance.

A new series of bulletins, completely illustrating and describing each item in the Elpeco line is now available. Let us know the particular type of equipment in which you are interested. We'll be glad to send the appropriate bulletins by return mail.

ELPECO

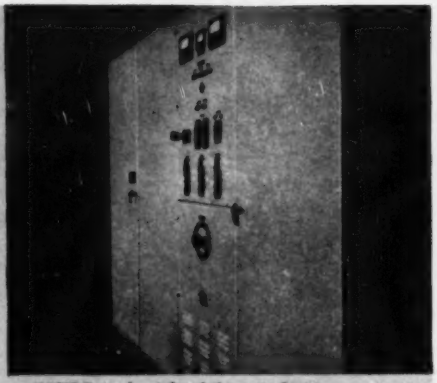
DIVISION OF ROLLER-SMITH CORP.
BETHLEHEM, PENNA.

Canadian Affiliate:
JAMES R. KEARNEY CORP. of Canada, Limited, Guelph, Ontario

Whether Mine..

ALLIS-CHALMERS MERCURY ARC RECTIFIERS WITH EXCLUSIVE DESIGN FEATURES CAN SUPPLY YOUR DC NEEDS

OUTSIDE view of one of five Allis-Chalmers rectifier substations serving the haulage system of a coal mining operation. Transmission line enters building at right, dc leaves at left. Entire substation can be moved as coal seams are exhausted, leaving only concrete slab behind.



INSIDE is the "dead front," factory packaged, 500 kw, 275 volt dc, sealed tube rectifier. Compartments are (L to R): for rectifier tubes, firing and auxiliary control, dc cathode breaker.

PUMP evacuated rectifiers are applied in heavy duty service from 750 kw up. The 3400 kw, 500 volt unit seen here operates in parallel with steam turbine driven dc generators in the electrolytic reduction of metal.

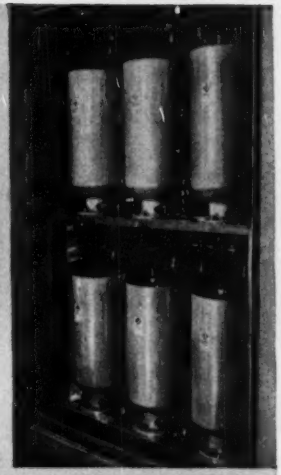
SIDE view of pump evacuated rectifier at left, showing the centralized placement of auxiliaries — exclusively Allis-Chalmers. Both evacuation equipment and heat exchanger are accessibly placed at one end.

ALLIS-CHALMERS

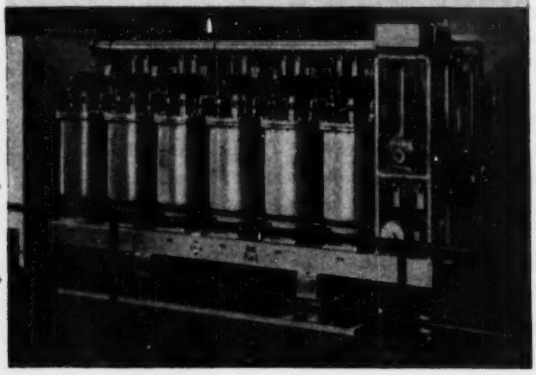
Allis-Chalmers Engineers Introduced Mercury Arc Rectifiers to U.S. Industry

. . or Mill!

MERCURY ARC RECTIFIERS



MODERN Allis-Chalmers design sealed tubes are located in the tube compartment. Other sealed tube units are supplied in ratings from 200 to 1000 kw.



WHEREVER DC IS NEEDED, from the mine to the mill, from the Elevated to the elevator, Allis-Chalmers rectifiers are quietly working away.

They combine the high efficiency, low maintenance characteristics of the mercury arc rectifier with exclusive A-C refinements in design and construction.

Factory packaged, light in weight, and requiring no special foundation, they can be placed right at the load center to cut dc feeder losses. Conversion efficiency is higher at all loads with large power savings during light load periods.

And in addition, only from Allis-Chalmers can you get rectifiers with these exclusive design refinements:

EXCLUSIVE ALLIS-CHALMERS FEATURES

- **Fixed excitation anode**—doesn't contact mercury and is independent of level, turbulence or impurities . . . requiring no adjustment, maintenance or replacement.
- **Continuous excitation** — pilot arc always present, eliminating need for continuous and synchronized re-ignition. Rectifier will ride through severe ac voltage disturbances.
- **Grid phase control**—in cooler and cleaner region near anode, where ion density is lowest.
- **Internal cooling system**—high heat transfer with seamless tube cooling coil located within the rectifier.
- **Arcover-free tank** — eliminates danger of arcing-over to tank by insulating entire arc path.
- **Enamelled anode seals** — multi-layer fused vitreous construction provides high-strength seal, unaffected by thermal variation.

All these design advances are obtainable *only* from Allis-Chalmers. When you consider mercury arc rectifiers in your expansion or modernization planning, consider Allis-Chalmers.

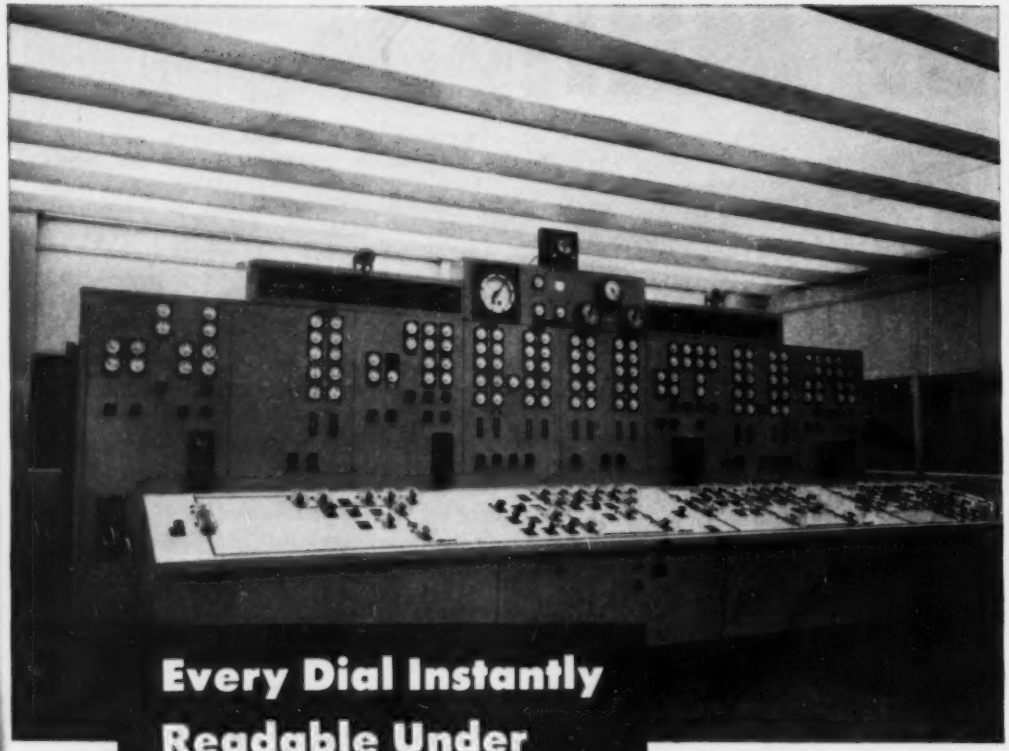
For help with rectifier application and a fuller explanation of exclusive superior features, call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3681

10 Mercury Arc Rectifier Advantages:-

☆ Compact and light weight ☆ No special foundation ☆ Push button starting with no synchronizing ☆ Quiet operation with high power factor ☆ Low idling loss and high conversion efficiency ☆ High momentary overload capacity ☆ Immunity to frequent short circuits ☆ No moving parts, contributing to low maintenance cost ☆ No attendance needed during operation ☆ Resistant to moisture, fumes ☆ Simple construction with long life

A-C ALLIS-CHALMERS



Every Dial Instantly Readable Under a Wakefield Ceiling

Total Area:
Approximately 1,325 Square Feet

Location:
Control Control Room of a Turbine Room

Designed Initial Illumination Level:
95 footcandles

Designed Working Illumination Level:
55 to 60 footcandles

Lamps Used:
72" and 96" T-12 430 MA lamps

Consulting Engineers:
United Engineers and Constructors, Inc., Philadelphia, Pennsylvania

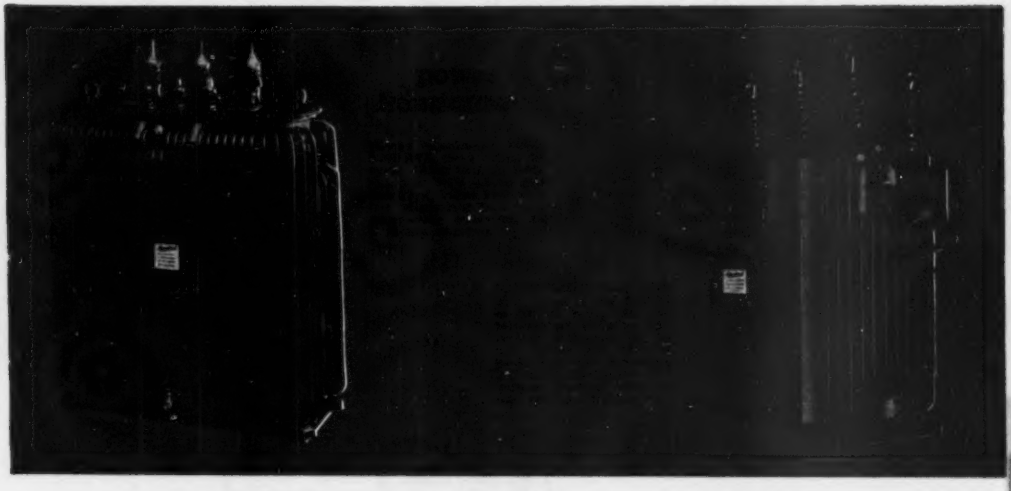
Licensed Agent:
Graybar Electric Company, Inc., Chicago, Illinois

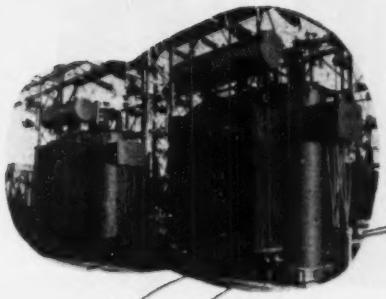
Licensed Installer:
United Engineers and Constructors, Inc., Philadelphia, Pennsylvania

This is the central control room of the turbine room of a large midwestern manufacturer of electrical equipment. A Wakefield Ceiling provides virtually perfect seeing conditions for quick, accurate dial readings. Light is diffused so evenly through the corrugated Plexiglas "ceiling" that both direct and reflected glare are for all practical purposes non-existent.

Not only is light controlled by this Wakefield Ceiling but sound and air diffusion as well. Suspended acoustical baffles furnish excellent sound absorption; and conditioned air is delivered into the room through the multiple openings at the edges of the corrugated Plexiglas diffusers. The Wakefield "Three-Way" Ceiling is a revolutionary development in environmental control. For a detailed, illustrated booklet, complete with working drawings, write to The F. W. Wakefield Brass Company, Vermilion, Ohio.

Wakefield Over-ALL Lighting





When dependability is a factor...

●Dependability in a transformer to you means trouble-free performance and long service life. To us, this means dependable construction.

For example, at STANDARD . . .

Tanks are built of rust-resisting steel, arc welded seams and tested under pressure. Liberal clearances are allowed from the windings and leads to tank and cover.

On the outside . . . attractive, long-wearing finishes with a primer coat and two finish coats of blue-gray enamel . . . on the inside, a lining of red oxide.

Covers are carefully and accurately fitted.

Tap changers and accessories efficiently placed with a specially designed tap changer switch.

These are just a few of the construction factors which STANDARD builds into Power Transformers. Look to STANDARD when you want dependability.

Everything Points To...

WRITE FOR BULLETIN CL-50

Tells the story with words and pictures of STANDARD'S complete line of transformers, and how they perform for every class of service . . . on the job.

THE Standard

WARREN, OHIO
REPRESENTATIVES IN PRINCIPAL CITIES

THE SAFEST WAY TO PURIFY INSULATING OIL

8 ADVANTAGES OF DE LAVAL PORTABLE INSULATING OIL OUTFITS

Constant high purifying efficiency—no shut-downs for cleaning or for renewal of parts during run

Dehydrates at a single pass—no re-running

Higher daily capacity of insulating oil saves maintenance costs.

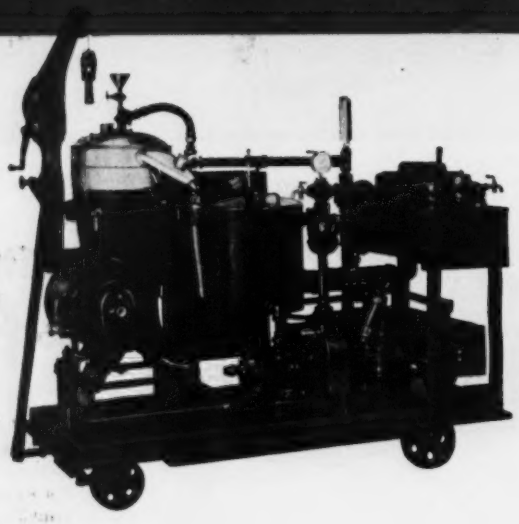
Heater cannot carbonize the insulating oil

Safest—continuous discharge of water prevents re-contamination of the insulating oil

Centrifugal purifier is economical to operate

Removes free water without aid of filter press; press used only to remove colloidal carbon

Low temperature purification; high dielectric value of oil maintained longer



The De Laval Centrifugal Oil Purifier continuously discharges the water which it removes from the oil. Therefore, it is the safest, most reliable means of maintaining insulating oil. No water collects in the bowl (purifying member) to render the machine ineffective. It purifies insulating oil in a single pass completely and economically.

●

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO. 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited Peterborough, Ont.

DE LAVAL

INSULATING OIL PURIFIERS

Transmission Towers by AMERICAN BRIDGE handle nation's first 330,000-volt line

● The first leg of the American Gas and Electric Service Corporation's projected high voltage transmission network has been completed with the construction of a 63-mi. 330,000-volt, double circuit link running from Appalachian Electric Power Company's Kanawha River, W. Va., station to its Philip Sporn plant.

The towers for this record-setting line were designed and fabricated by American Bridge as the result of valuable data gathered from the A. G. & E. sponsored 500,000-volt test line at Ohio Power Company's Tidd plant, Brilliant, Ohio, in cooperation with other manufacturers of high voltage transmission line equipment.

These towers are approximately 150 feet tall and carry 6 conductors of 1,275,000 C.M., A.C.S.R. expanded cable (1.6"OD). The towers are designed for straight-line spans of 1700 ft.

The technical knowledge and field experience American Bridge has acquired in this and hundreds of other transmission line installations may be just the answer to your tower problems. Our engineers welcome an opportunity to figure with you without obligation. Just write to the nearest office listed below.

AMERICAN BRIDGE DIVISION, UNITED STATES STEEL COMPANY
GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON
CHICAGO · CINCINNATI · CLEVELAND · DALLAS · DENVER · DETROIT · DULUTH · ELMIRA
GARY · MEMPHIS · MINNEAPOLIS · NEW YORK · PHILADELPHIA · PITTSBURGH
PORTLAND, ORE. · ROANOKE · ST. LOUIS · SAN FRANCISCO · TRENTON
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

DESIGN REDUCES FOUNDATION INSTALLATION COSTS. Important savings in time, labor, and materials were made possible through use of steel grillage earth anchors and variable leg extensions as shown above. Many other simplified installation and frill-free construction features are obtained through American Bridge designs.

USS

AMERICAN BRIDGE

UNITED STATES STEEL

FLYING FURTHER FOR A NON-STOP RECORD, IN FEBRUARY 1949 "LUCKY LADY", A USAF SUPER-FORTRESS, FLEW FROM FT. WORTH, TEXAS, 23,452 MILES AROUND THE WORLD IN 94 HOURS, REFUELING 4 TIMES IN FLIGHT.

JENKINS

Gold Seal Tape

GOES FURTHER, TOO...

GUARANTEED FOOTAGE
You get full measure with every roll. Tapes up tight and snug to the last inch.

NO WASTE
All Gold Seal Friction Tape tears evenly, does not ravel, molds to uneven surfaces.

HIGH DIELECTRIC
Less Gold Seal Tape needed per job. No pinholes; one tape thickness insulates.

LASTING "TACK"
Gold Seal sticks to the job under toughest conditions of cold and moisture.

EASY HANDLING
Gold Seal does not peel, dry out or smear the hands in hottest weather.

SPEEDS THE JOB
Linemen and electricians prefer Gold Seal Tape. It saves time and trouble.

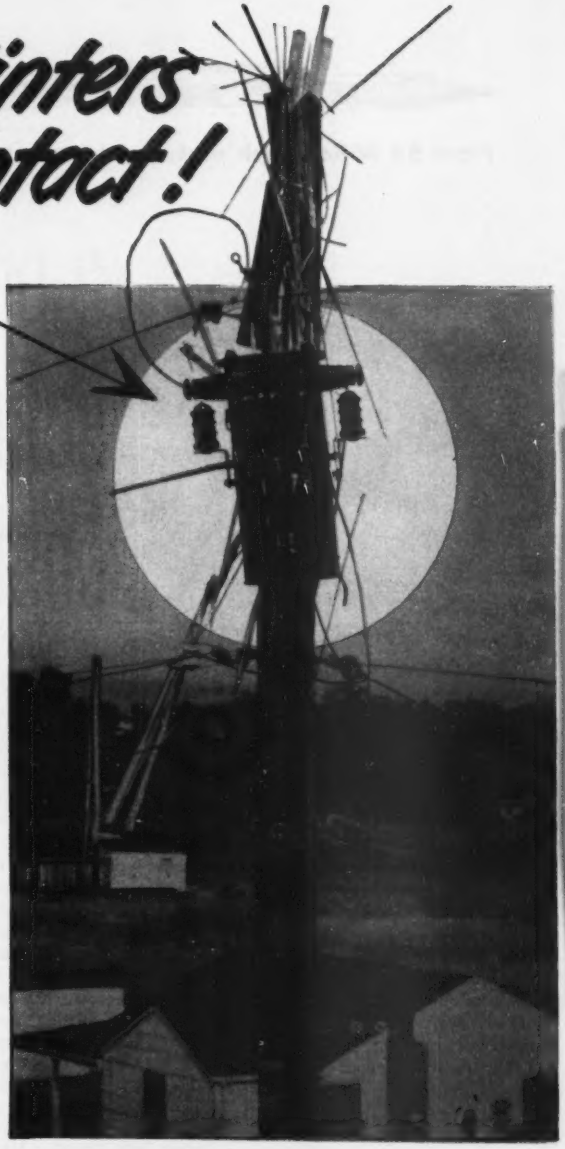
IT'S YOUR BEST BUY FOR PLANT SUPPLY
Specify Gold Seal Tape and save.

FRICTION AND RUBBER TAPES
In either 10-roll cartons or single rolls. Every roll sealed in cellophane, stays fresh. Jenkins Bros., (Rubber Division), 100 Park Ave., New York 17.

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet ASTM and Federal Specifications.

A PRODUCT OF JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES

Pole in splinters ... service intact!



On Loretto Heights Hill, near Englewood, on the Colorado Central Power Company system, this Westinghouse "CSP®" Distribution Transformer took a direct stroke of lightning early in the evening, yet maintained service with no interruption throughout the night!

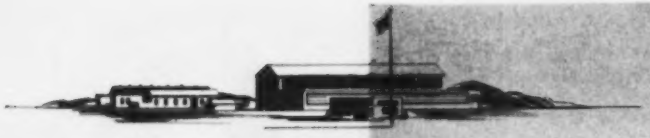
The following day, when a new pole was installed, the transformer was found to be completely unharmed, although the ground lead from the tank discharge gap was burned off. The unit was therefore again hooked up for service.

Westinghouse "CSP" (Completely Self-Protecting) Transformers, because *all* parts are factory co-ordinated, provide better protection against lightning, surges, short circuits, and overloads, giving assurance of service continuity. Your Westinghouse Representative will be glad to show you actual figures which explain why Westinghouse "CSP" Transformers offer bigger savings in installation and maintenance costs. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70616-A

"CSP" devices . . . originated and patented by Westinghouse

WESTINGHOUSE

"CSP" DISTRIBUTION TRANSFORMERS



From B&W Research and Development . . .

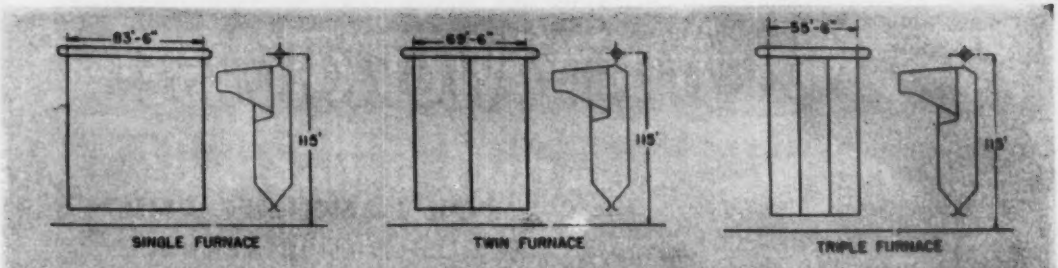
a practical solution to cost problems...

B&W DIVIDED

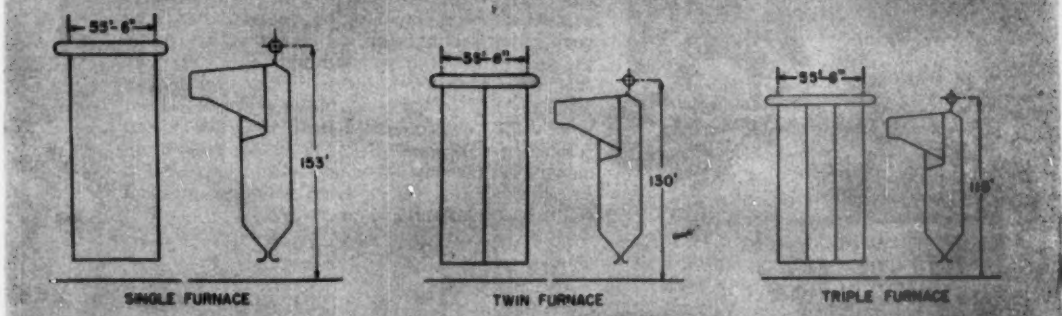
A practical, long-proved solution to rising construction costs may be found in the B&W Divided-Furnace Boiler. Whether it is a problem of conserving height, width, or both—especially for units with large heat input—B&W's Divided-Furnace design offers remarkable economies. The sketches on the opposite page show typical savings in space for twin-furnace and triple-furnace construction as compared with single-furnace construction.

A furnace division wall receives heat from both sides and therefore must be assured an adequate supply of water. With the B&W Cyclone-Steam Separator, circulation in division walls of B&W boilers has always been more than ample—as proved by long-term central station operation at boiler design pressures as high as 2650 psi. Many years of experience stand behind B&W's Divided-Furnace construction with all types of large units—Radiant, Stirling, and Open-Pass. Over 75 B&W Divided-Furnace Boilers are in operation—many for over 10 years—and more than 80 units are under construction, for the following electric utilities:

Alabama Power Company • Appalachian Electric Power Company • Arkansas Power & Light Company • Cincinnati Gas & Electric Company • City of Los Angeles • Cleveland Electric Illuminating Company • Commonwealth Edison Company • Consolidated Edison Company of N. Y. Inc. • Consolidated Gas, Electric Light & Power Company of Baltimore • Dallas Power & Light Company • Detroit Edison Company • Duquesne Light Company • Electricite France • Georgia Power Company • Houston Lighting & Power Company • Indiana & Michigan Electric Company • Jersey Central Power & Light Company • Kentucky Utilities Company • Long Island Lighting Company • Middle South Utilities, Inc. • Monongahela Power Company • Niagara-Mohawk Power Corp. • Northern Indiana Public Service Company • Ohio Edison Company • Ohio Power Company • Pacific Gas & Electric Company • Pennsylvania Electric Company • Philadelphia Electric Company • Public Service Company of Colorado • Public Service Company of Northern Illinois • Public Service Company of Indiana Inc. • Public Service Company of Oklahoma • Public Service Electric & Gas Company • Southern California Edison Company • Tennessee Valley Authority • Texas Electric Service Company • Texas Power & Light Company • Toledo Edison Corp. • Union Electric Company • West Penn Power Company • Wisconsin Power & Light Company



EFFECT OF DIVISION WALLS ON BOILER WIDTH—KEEPING HEIGHT CONSTANT



EFFECT OF DIVISION WALLS ON BOILER HEIGHT—KEEPING WIDTH CONSTANT

FURNACE

Division wall furnace construction is used in combination with other significant achievements of B&W Research and Development, including the Cyclone Furnace, Pressure-Firing, Gas Recirculation, and improved alloys for high steam temperatures. Widely accepted throughout the power industry, these modern B&W advances are making major contributions to more economical and reliable steam generation.

B&W's continuing program of progressive research combined with its broad experience in designing and building boilers with the highest capacities in existing pressure-temperature ranges, assure you of the most efficient and economical solutions to your specific steam generation problems.

ADVANTAGES OF DIVIDED FURNACE CONSTRUCTION

- Provides greater cooling area without increasing furnace volume
- Reduces steel and other material costs by keeping boiler and building volume to a minimum
- Lowers furnace construction costs
- Cuts operating costs by reducing slagging in furnace and in convection surface

Triple furnace boilers for 1 boiler—1 turbine units of over 200,000 KW capacity are now being constructed

BABCOCK & WILCOX

G-5697

UTILITY WORKHORSE-

LINE CONSTRUCTION BODY (500)
Medium and heavy duty work. Vertical compartments are optional . . . can be equipped to fit individual needs.

REVOLVING AERIAL LADDER
Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.

LIGHT DUTY MAINTENANCE BODY (350)
Fold-over type derrick will handle poles up to 40' in length. 24' ladder extends from rear of body.

HYDRAULIC TOWER
Available in sizes from 21' to 30'. Platform revolves full 360°. Tower can be operated from cab or platform.

There are many styles of *Powers-American* Bodies not shown here. Write for descriptive catalog today.

FOR LONG LIFE AND TROUBLE FREE SERVICE

All *Powers-American* bodies have *earned* the reputation of "workhorse" of the utility industry by years of faithful performance. No matter how tough the job or the operating conditions, they pull more than their share of the load by stepping up crew efficiency and lowering operating costs. Whatever your utility body needs, *Powers-American* is your *1* source for *all types* of utility bodies and equipment. Write today for more information. Put a *Powers-American* "workhorse" on your job and watch the team pull ahead!

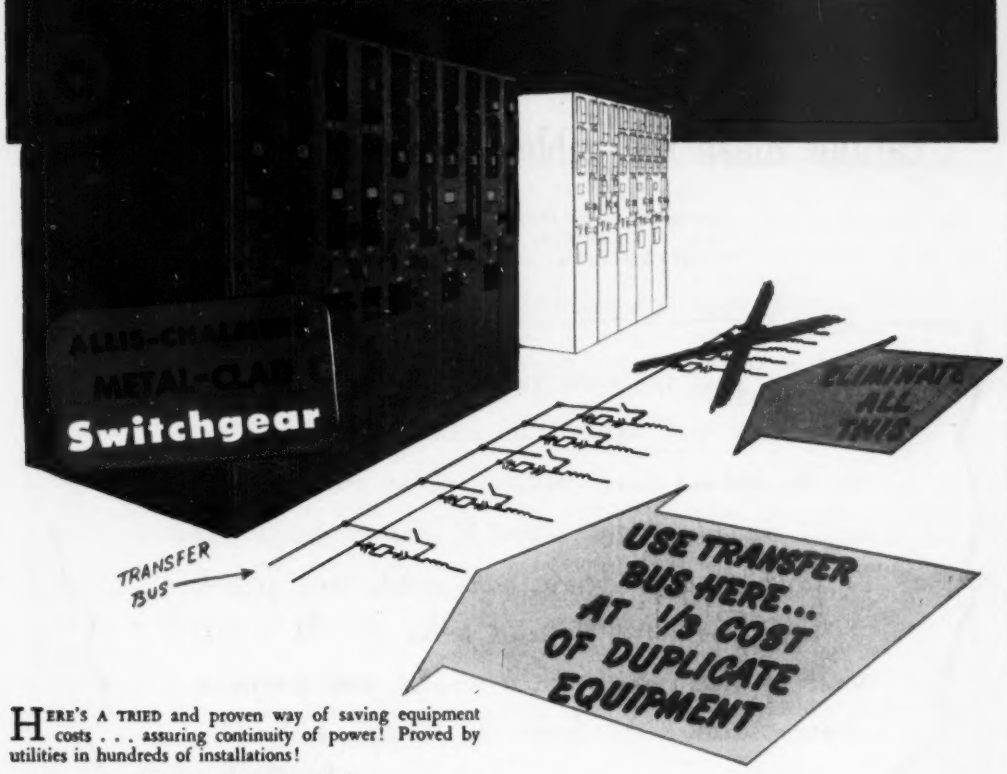
"The Accepted Standard with Utilities Everywhere"

LINE CONSTRUCTION BODY (600)
Completely equipped to carry all tools and materials needed for line work. Can be furnished with winch and derrick, compressor, digger, or any special equipment required . . . for use in any phase of the utility industry. Available in 9' to 14' lengths, with or without built-in crew compartment.

POWERS *American* DIVISION
AGB

PUBLIC UTILITY BODIES AND EQUIPMENT

Why Buy Duplicate Switchgear to Assure Power Continuity?



HERE'S A TRIED and proven way of saving equipment costs . . . assuring continuity of power! Proved by utilities in hundreds of installations!

What is a Transfer Bus?

It's simply a by-pass bus circuit that parallels the main switchgear bus. A switching means is provided so that loads can be transferred to the transfer bus. It's a standby in case anything happens to the main bus. Also, makes it possible to withdraw and maintain circuit breakers, or inspect main bus without power stoppage.

What are Other Advantages?

1. Saves Cost. Transfer bus costs about ⅓ as much as the additional equipment needed to provide duplicate switchgear to do this same job.
2. Cuts Space in Half. Allis-Chalmers supplies transfer bus in same cubicle as switchgear without adding cubicles. Thus an Allis-Chalmers installation cuts space one-half.

In addition, you can insure against failure of power source by providing a double end feed with the one set of switchgear and be as sure of power supply as if you had duplicate switchgear.

Depending on the job you want to do, there are many arrangements that Allis-Chalmers can provide. In many cases, the engineering has already been done.

Ask an Allis-Chalmers engineer about transfer bus arrangements and what they can mean to your plant in savings and service. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3731

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

"I cannot make the cables before I get the wire"

Sounds like an old refrain, doesn't it? It is at least as old as 1880, when A. G. DeWolfe wrote from Seymour, Connecticut (where Kerite Cable still is manufactured) to Austin G. Day in New York:

[illegible] 5, 1880

I have just got home from Ansonia.
They have not made the wire yet. They are much behind their orders Our order has been in 12 days and they have 8 tons of copper and 12 tons of brass before our order not filled
They promised to send some of the wire first of the week. They would not promise how much. It looks as though I could not get the 10 miles of cable by the 20th.
Will do all I can but cannot make the cables before I get the wire.

There isn't any modern moral to this story, except perhaps that, however impatient we Americans become, we always seem to outlast our crises and do a bigger and better job no matter what obstacles are put in our way.

KERITE CABLE

The Kerite Company, 30 Church St., New York 7, N. Y.
Offices also at 122 Michigan Ave., Chicago; 582 Market St., San Francisco; 3901 San Fernando Rd., Glendale 4, Calif.

THE VALUE AND SERVICE LIFE OF A PRODUCT CAN BE NO GREATER THAN THE INTEGRITY AND CRAFTSMANSHIP OF ITS MAKER.

Going It Blind!

Just making motions and hoping for the best. That's about the only way to sum up promotion of home lighting by electric utilities today. A lot of them are doing things along this line, but they don't know what results they are getting and at what cost.

This is the conclusion that emerges in perfect clarity from a survey of such promotion reported in this issue of Electrical World.

The survey covers the activities of utilities serving over three fourths of the residential customers in the country. Some 88% of the respondents state that something, much or little, is being done by each one in the promotion of home lighting. The tabulated data of the report furnish an excellent opportunity for any utility to compare its own activities with those of others of comparable size.

Two points of special significance were covered in the survey. One has to do with the amount of electricity used for lighting by the average customer. Respondents were asked to furnish estimates of such use or, if no definite figures had been compiled, to make guesses. Estimates were given in 36 replies, guesses in 80, and in 36 the question was not answered. Both estimates and guesses covered about the same range, from over 1,100 kwhr down to around 300. This parallelism suggests there is not much to choose between the estimates and the guesses in respect to accuracy.

The responses on this point, and the lack of them, indicate that the average utility just does not know how large a factor home lighting is in its load and in its revenue. Will system investment economy be improved by a larger home lighting load? Will revenue be significantly increased? These questions cannot be answered with any assurance if the size of the load is only or not even guessed at.

The other point is concerned with cost of home lighting promotion and revenue obtained from it. Only five of the 152 survey returns gave figures in reply to this question. It went unanswered or elicited "Don't know," "No record," or the like from all the rest. The five replies showed that promotion paid its way more than handsomely, in the minds of the respondents at least. But this is much less important than the fact that well over 90% of the utilities doing much or little in promotion of home lighting know neither how much it is costing them nor what they are getting from it.

A basic requirement of intelligent sales planning is knowledge of the market. The results of the survey strongly indicate that most utilities do not have this knowledge on home lighting. That is why we say they are just "going it blind."

A Light Bulb Talks to the Industry

I am a 100-w light bulb. You call me a lamp. But that doesn't bother me because the millions of people who buy me call me a bulb. I'm not much to look at. I haven't the glamor of an all-electric kitchen or the load appeal of a heat pump. But I do come from a good family. I often heard my grandfather, a 25-w bulb, brag that when he was young he made your industry possible. But he may have been boasting a little as old men will. I am a bit proud though about the way my family, the bulb family, has served the people. We don't play hard to get. I cost about 20¢ and even a child can buy me at any one of thousands of retail outlets.

Perhaps that's why you ignore me, except for brief campaigns, and devote so much of your time to peddling appliances. You forget that I am worth far more to you than my measly selling price indicates. Five of me burning four hours a day in the homes of all the people you serve would mean an annual sale of over 29 billion kwhr a year. And remember most of the electricity I use is the most profitable you sell. I work in the off-peak period and use "juice" sold at the residential rate. Don't you think it is about time that you paid more attention to me?

Sleeves, Hose, and Blankets

Arms loom prominent in any statistical breakdown of points of body contact with energized wires when linemen work on poles. Such contact could not happen if some good insulation were interposed between the live conductor and the man's bare arm. What behooves a man to wear rubber gloves and then lose his life because of an inadvertent contact above the cuff?

There is only one excuse for the fatalities that continue to happen in this critical area of the body. It is not a valid excuse at all because it simmers down to a simple matter of unwillingness to face the issue. The lineman is still somewhat of a bravado and braggadocio personality, but it is more humane to hurt his feelings than to have him lose all sense of feeling. Regardless of anybody's feelings or preferences it is incumbent on the utility to prescribe and provide work environment so safe that even a good man can make a mis-move occasionally with impunity. Working with unprotected arms is not a mis-move, it is an invitation to death.

Reluctance to use rubber sleeves, rubber hose, and rubber blankets on the part of the lineman or his company accounts for some of the unfortunate electric shock and burn cases that continue to mar the safety record. Enforcing the use of one or more of them on primary lines would practically eliminate the fatalities. Use of live-line tools would, of course, give an equal gain.

More . . . And More . . . And More

Here is a story of industrial expansion—unrivaled, unmatched—in American economic history. It is freedom's record. This is the opening sentence of "More . . . And More . . . And More," a booklet published by the National Association of Electric Companies. No sentence could better epitomize the contents of this unusual publication.

"More and More" tells the story of how the investor-owned companies have expanded their generating capacity to meet all demands. It tells also how they will expand to meet future demands and how much they have spent and will spend to make this expansion possible.

The booklet is the answer to those who cry that the private companies have fallen down on the job, that the federal government must build more and more power plants and more and more transmission lines to serve the public. This is not a booklet filled with fancy writing. This is a book of data, 20 pages of cold figures.

As excellent and outstanding as is this booklet, it will have no value unless it secures the wide distribution that it deserves. NAEC cannot do this job. This is an obligation of the industry. Stephen Fitzgerald Co, 502 Park Ave., New York 22, N. Y., will be glad to supply copies at a modest price and to suggest those who should get them.

False Economies in Atomic Power

Electric power from atomic energy is today as uneconomic as wind power at Niagara Falls. But the casual reader of recent reports would reach the opposite conclusion. A Monsanto Chemical Co representative states that the problem of economic production of electrical power from atomic energy can be solved with the simultaneous manufacture of plutonium for sale to the government.

It is obvious from the Monsanto statement that heat for economic generation of electric power will be a by-product from the production of plutonium. The revenue from government for plutonium is an essential factor in the economics of this process. Because the government's demand for plutonium in large quantities could vanish overnight, it is difficult to see how this program could be economic from a business man's point of view. One does not spend $200 per kilowatt for generating capacity when the boiler and fuel handling facilities may become obsolete in a few years.

We do not wish to imply that we do not favor the investigations of the feasibility of use of atomic energy in power generation. We heartily support these activities. Such investigations are natural fields of endeavor for private enterprise. If money is lost in the end, it should be the funds of the buyer of common stocks and not that of the taxpayer. If generation of power proves to be economic rather than just feasible, the exploitation of the process for profit should be in the hands of private enterprise.

But when reports are made public, they should be carefully worded so as not to confuse the public. Atomic power plants can be feasible without being economic.

An Apology to Sen Wallace F. Bennett

We editorialized in the July 14 issue to the effect that Sen Wallace F. Bennett had been swayed toward the "Fair Deal" thinking in Washington. The basis for this was his speech delivered before the annual meeting of the Edison Electric Institute. Senator Bennett assures us that his point of view is completely opposite to that credited to him and that in his speech he only intended to interpret the attitude of many other Congressmen. We believe that we interpreted Senator Bennett's remarks incorrectly. His own letter of explanation appears on Page 187.

THE ELECTRICAL WEEK

Featured in the News

Nuclear power plants can be had, for a price. Article on Walker L. Cisler's analysis of the problem appears on page 106 . . . The utilities in the South are finding ways to beat the drought (p 109) . . . The St. Lawrence Seaway and Power Project is now two steps closer (p 110) . . . Whatcom PUD balks at going along with others in purchase of Puget Sound P&L Co (p 111) . . . California and Arizona are feuding over water rights in the Central Arizona project (p 112) . . . "New money" financing sets a record (p 114) . . . P. L. Smith predicts there will be plenty of private power in announcing NAEC's new booklet, "More . . . And More . . . And More" (p 116).

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Latest from Washington—New interpretation of allotment procedures: Utility steel orders already placed for third and fourth quarters, which cannot be delivered by Nov. 30 or Feb. 27, respectively, become carryover orders and must be delivered as soon as possible after these "cutoff" dates. New allotments are not required for these carryovers. However, new steel orders for these two quarters cannot be placed unless delivery can be made by the cutoff dates . . . SEC has already set up an embryo section on public utility integration to organize the study suggested by Chairman Cook (EW, July 21, p 10). Electric systems will come first in the proposed study . . . Electric utilities have been granted 492 certificates for rapid tax amortization on projects involving some 19 million kw. DPA has denied 179 applications for these certificates and 101 are still pending . . . Reclamation Bureau has awarded a contract for four turbines for its Palisades project on Snake River in Idaho . . . Col Hubert S. Miller is new Omaha district engineer for the Army Corps of Engineers.

From Middle Atlantic—Pennsylvania Electric buys power plant of Ebensburg Coal Co which served the towns of Revloc and Colver. Plant is considered inadequate and Penelec has been providing some power to the firm.

From East North Central—Illinois Power gets ICC approval to buy Staunton municipal system for $213,150.

From Southeast—Virginia E&P reports record peak of 771,000 kw on July 21 because of increased use of fans, air-conditioners, and longer running periods for refrigerators, water coolers, and freezer units . . . Recent campaign by C. D. Anderson, power sales manager, Savannah E&P, to raise the power factor of industrial customers resulted in upping it to about 88% compared with 77% . . . South Carolina E&G is promoting installation of heat pumps for new school buildings in Charleston. Company officials are planning to take school officials to see installation in St. Petersburg, Fla., schools . . . Electric appliance dealers' sales in Florida P&L area totaled $22.4 million for first six months of 1952. This is a record high and is 31% greater than sales for the like 1951 period.

From the Far West—Los Angeles Department of W&P will make a series capacitor installation for experimental purposes on its 230-kv Owens River Gorge transmission circuit. During recent Southern California quake, department suffered no loss of revenue, but its crews spent 6,959 man-hours repairing system. Extra load of customers turning on lights, radios, and television sets more than made up for customers who were out . . . Oregon PUC approves sale of California-Oregon Power's Bellview district to City of Ashland for $48,760. Bellview district only recently was voted into the city.

Construction—Work on large addition to Virginia E&P's office building in Richmond has been at a standstill since January 1952 because of lack of steel . . . Boston Edison puts into service second 81,250-kw unit at Edgar steam plant; another is scheduled for 1954.

Financial—Jacksonville, Fla., City Council plans to ask voters approval on Oct. 7 to sell $18-million bond issue for expansion of electric system.

Legislation—In Jacksonville, Fla., Councilman James C. Merrill has withdrawn his bill to place a 10% tax on utility services. Other members of City Council hailed the move.

Rates—Utah P&L and subsidiary have received PUC approval to up rates about $1,210,000 a year ($1 million in Utah and $210,000 in Colorado). PSC hearings on $175,000 a year rate hike in Idaho were concluded on July 23 without public opposition . . . Savannah E&P asks Georgia PSC for a general rate increase of slightly over 7% . . . Wisconsin Public Service gets PSC approval to increase rates by $901,000 a year (6.6% rate of return), effective on meter readings after Aug. 14 . . . Pittsburgh's Mayor David Lawrence raps PUC and GOP state administration. Said Lawrence: "We must change the law to compel Republican appointees to PUC to do their honest duty."

USBR Commissioner Michael Straus threw the switch on Aug. 2 which started the 15,000-kw hydro plant known as Boysen Dam in Wyoming.

Production of bituminous coal and lignite totaled 261.3 million net tons in first 30 weeks of 1952 versus 295.7 million for similar 1951 period. This represents an 11.6% decrease.

Westinghouse and General Electric are in agreement on the effects of the recent steel strike. Both companies reported some minor curtailment of production. Both believe that the outlook is for steel shortages in spots for the remainder of 1952.

Congratulations—W. J. Rose, secretary of American G&E since 1949, is elected vice president . . . Anaconda Wire & Cable elects R. B. Steinmetz vice president in charge of manufacturing operations and L. R. Love vice president in charge of sales.

WASHINGTON COMMENT

JESSE MOCK

It will take some close watching to see the private-public power issue develop in this year's presidential campaign. The issue is there—no doubt about that. Platforms of the Republican and Democratic parties dealt with it in the manner expected. Democrats fully supported the federal development of electric power and construction of transmission lines in the Roosevelt-Truman tradition. Republicans turned down the valley authority idea and steered clear of endorsing the preference clause.

But unless there is a radical change this year, neither the voters nor the parties will be inclined to take the words of the platforms seriously. In the minds of most party regulars, the platform is merely for the purpose of pulling in a few votes. When it fails in that purpose, it is time to toss it aside.

Nominees Will Interpret Platforms . . . As in the past, platforms are sufficiently flexible to be interpreted in the way that the presidential nominees want to interpret them. While the Democratic power planks sound pretty specific this time, there is still plenty of room for Governor Stevenson to emphasize them or de-emphasize them as he sees fit. Nominee Eisenhower can practically write his own ticket on the power issue without violating the Republican planks.

For the most part, then, the role the next administration will play in electric power development will be determined by the attitude of the winning nominee. It will be difficult for either Eisenhower or Stevenson to sidestep completely the issue during the campaign which ends Nov. 4. Up until now, both of them have been noticeably non-committal on the subject.

Power Issue Not a Primary One . . . There are reasons for this. Apparently neither of the nominees consider the public-private power issue a primary one in the campaign or one of national significance. Neither of the candidates has had occasion to study in detail the ramifications of the issue or has faced specific situations in which he has had to make a clear-cut decision on this issue.

Both Stevenson and Eisenhower are more concerned with international affairs and broad domestic philosophies than with specific issues. It may very well be that their views on electric power development are similar enough to avoid a top-level argument on the issue.

Watch for the issue to develop something like this:

Secondary campaigners for the two candidates will bring up the subject. On the Democratic side President Truman and Interior Secretary Oscar Chapman are bound to stump for federal power development. It is a pet cause of both these men who will be booked for campaign chores. On the Republican side it will be difficult for such men as Sen Wayne Morse of Oregon or Gov Earl Warren of California to do much campaigning without discussing the power issue.

The issue is mainly a local or regional one for campaign purposes. There will be a lot of talk about large hydroelectric projects in the West—less about it in the East. Such projects as the redevelopment of power at Niagara and the St. Lawrence power development will have to be dealt with when the compaigns are carried to New York and New England. In the Pacific Northwest it will be all but impossible for presidential campaigners to avoid discussion of the Hells Canyon project and a number of other multipurpose dams.

At this point the candidates appear to be on firm ground in considering the power issue as strictly a secondary one in a national campaign. It is the one that may change some votes, but it does not now appear to be one that will be a major factor in deciding the election.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Gas turbine noise comes principally from the first three stages and is pitched at the blade-passing frequencies of those stages. That is one location for a silencer.

Moisture content as low as 10 parts per million by weight can now be determined in transformer oils, crystals and synthetic yarns.

Bepo, Britain's experimental power reactor at Harwell has an active core consisting of a 26 ft cube of graphite (850 tons) and having 1,849 channels of which the central 900 have uranium bars 12 in. long and 0.9 in. diam. Total uranium 40 tons, an amount capable of serving all U.S.A. power needs for a year.

Gases can be ionized by collision, cosmic rays, natural radioactivity X-rays, thermal action, flame, photo-electric emission, thermionic emission.

Ozone results when oxygen and nitrogen (ingredients of air) molecules are ionized in an electric field. The unstable atoms of O and N also combine to form N_2O_5, N_2O_3, N_2O_4, etc. The latter joins with water to form nitric and nitrous acids.

Ozone is slightly soluble in water, much more soluble in carbon tetrachloride and reverts to O_2 above 280 C.

Preheating of over-fire air and promotion of turbulence by furnace gas reinjection can be effective in improving low load performance of spreader stokers as well as contributing at high loads.

Magnetic particle clutches operate by applying magnetic excitation to finely divided iron particles placed in the gap between the working members. Slipping and lock-in torque are identical for a given excitation. Shear force is approximately proportional to current up to saturation.

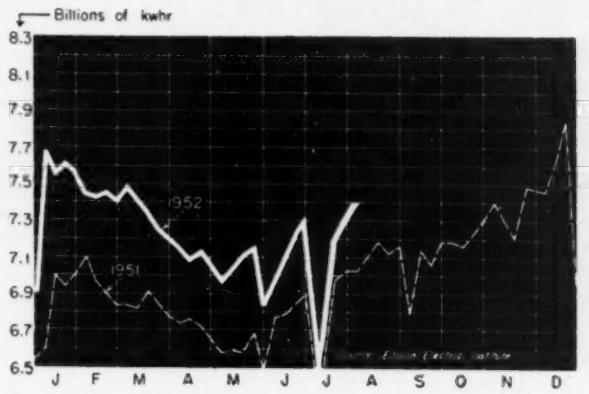
Parallel lines may interfere with attainment of 1- to 3-cycle fault clearance on some interconnections.

Built-in washing devices make it possible to clean a gas turbine and its recuperator expeditiously during the periodic shut-down periods.

Electric-blasting caps can be detonated by blasting circuits exposed to radio energy. They should be carried and kept in shielding metal cans.

Magnetic-particle clutches show practically no wear, require less than ½% of the power output as exciting coil input, give output proportional to shaft speeds and are being built up to several hundred horsepower.

STATISTICS



Output Week Ended Aug. 2—7,404,913,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Aug. 2	+5.7	+5.4	+2.5	—1.7	+6.1	+15.2	+16.3	+7.9	+2.4	+6.0
July 26	+4.6	+6.0	+3.6	—4.2	+4.1	+15.4	+10.9	+9.8	+3.1	+2.9
July 19	+3.0	+4.9	+1.2	—4.4	+4.2	+10.7	+9.5	+4.8	+2.1	+3.2

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Apr.	64.8	66.5	60.4
Capacity (Million Kw)	June	77.17	77.01	72.30
Production (Billion Kwhr)	May	31.82	31.51	29.87
Hydro		9.69	9.96	8.54
Fuel		22.13	21.55	21.33
Fuel Consumption				
Coal (Million Tons)	May	8.01	8.05	7.99
Oil (Million Barrels)		3.72	4.20	4.51
Gas (Billion Cu Ft)		76.99	66.50	70.57
Sales (Billion Kwhr)	May	27.94	28.33	26.35
Residential		7.52	7.91	6.68
Commercial		4.74	4.74	4.34
Industrial		13.83	13.85	13.42
Other		1.86	1.83	1.90
Net Income Class A & B Companies ($ Million)	May	68.24	75.82	60.81
Estimated Dec. 52 Peak (Million Kw)	May	80.0	80.2	78.8
Kwhr per Residential Customer (12 Month Average)	May	2,078	2,066	1,909
Revenue per Kwhr Residential Service (12 Month Average)	May	2.78¢	2.79¢	2.85¢
Canadian Production (Billion Kwhr)	May	5.33	5.03	5.13

Business Statistics

FRB Industrial Production Index†††	June	203*	215	223
Gross National Product Annual Rate ($ Billion)	1stQtr.	339.0	334.6	319.5
E. W. 5 Industry Production Index	June	96.9*	116.0	123.2
ENR Construction Cost Index††	July	119.6	117.8	113.7
BLS Consumer's Price Index	May	189.0	188.7	185.4
NEMA Insulation Materials, Sales Index†	May	517	545	614
NEMA Electric Appliance Sales Index†	May	219	221	296
NEMA Household Refrig. Sales Index†	May	132	133	183
Metal prices (Aug. 4)				
Copper, Conn. V., lb		$ .24½	$ .24½	$ .24½
Lead, N. Y., lb		.16	.16	.17
Zinc, prime Western E. St. Louis, lb		.15	.15	.17½
Tin, Straits, qual. N. Y., lb		1.21½	1.21½	1.03
Aluminum, ingot, base price		.19	.19	.19
Nickel, base price		.56½	.56½	.56½
Steel, billets, Pitts., ton		56.00	56.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Estimated. † 1936=100 †† 1949=100 ††† 1937-39=100 (Unadjusted)

Utility Superintendents Top Municipal Payrolls

Median salary of electric utility superintendents is consistently above that of city engineers and directors of public works in comparable population groups. The *1952 Municipal Year Book*, published by the International City Managers' Association reveals this fact.

Salaries of Electric Utility Superintendents

Population Group	No. of Cities Reporting	Mean Average Salary
Over 100,000	6	$16,207
50,000 to 100,000	7	10,439
25,000 to 50,000	29	7,586
10,000 to 25,000	100	6,607
5,000 to 10,000	158	5,493

A total of 402 cities or 83% of the 487 cities over 5,000 population which have municipally owned electric utilities provided statistical information for this book.

The association also reveals municipally-owned electric utilities are managed by public utility boards in 134 cities over one-half of these boards (68) are appointed by the city council, an additional 49 by the mayor, and four by the city manager. Board members are elected in ten cities, in three the board is self-perpetuating.

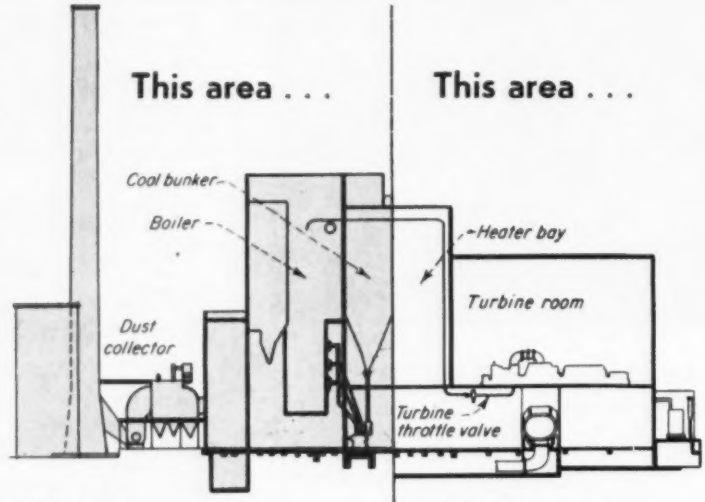
The city council appoints the utility superintendent in one-third of the cities reporting, and the utility board appoints him in an additional one-third. The city manager appoints the superintendent in 20% of the cities, and the mayor in the remainder.

A total of 181 cities (45% of those reporting) have no electric generating plant and purchase all electricity distributed. An additional 72 cities purchase part of their electricity. Of these 72 cities, seven purchase from 75 to 99% of their distributed power, 12 buy from 50 to 74%, 14 from 25 to 49%, and 39 buy from 1 to 24%.

A total of 138 cities (36% of those reporting) have no electric utility debt. In the other 242 reporting cities, debt ranged from $500 to over $1,000,000.

Payments in lieu of taxes and other contributions to city government were reported by 342 cities and range from $2,100 to over $1 million. Nineteen of these cities reported that all profits of the utilities are transferred to the general fund. In 77 cities the utility makes no cash contribution to the city government.

In the power plant of tomorrow:



with these costs . . .

Steam Generation

Total cost	$48,293,000
Cost per kw	$77
% of total plant	49%
% of total company investment	17%

. . . could be replaced by a nuclear heat power reactor

with these costs . . .

Electric Generation

Total cost	$50,407,000
Cost per kw	$81
% of total plant	51%
% of total company investment	18%

. . . would be unaffected by installation of the nuclear unit

Can Nuclear Power Plants Compete?

The year-long study Detroit Edison and Dow Chemical companies made on industrial use of atomic energy showed definitely that a nuclear reactor can be used to produce electricity on a commercial basis.

Now the question is, How can a nuclear reactor be developed to deliver energy at a cost competitive with a normal source of heat?

The question was answered in part by Walker L. Cisler, Detroit Edison's president, at the institute on industrial and legal problems of atomic energy sponsored by the University of Michigan Law School (EW, July 14, p 118). He outlined the approach the Dow-Edison team will be taking in its development work in the following 12 months.

"As a source of heat energy alone," Cisler said, "atomic fission is unlikely to be commercially successful in the foreseeable future without assurance of additional revenue from the sale of atomic by-product materials like plutonium."

The Dow-Edison project, he added, is working to develop this and other revenue possibilities.

One Way . . . At the present stage of atomic research, no direct conversion of nuclear energy into electric energy appears feasible for industrial use. Today the only practical way to produce electric power from atomic energy appears to be this:

1. Generate heat through nuclear fission in a reactor
2. Use the heat to make steam.
3. Use the steam to turn a turbine in conventional fashion.

So, in the first atomic generating stations, heat-producing elements of a power plant would be replaced by a nuclear reactor. Electric generation elements would be basically unchanged (see chart above).

Dow-Edison, Cisler said, has worked out a theoretical limit on the amount of money that could justifiably be spent for the nuclear reactor portion of the power plant of the future. That figure

is $277 per kilowatt, assuming no fuel at no cost.

To arrive at this figure, the companies broke their prospective nuclear plant into two components: one having to do with production and delivery of heat units from fuel and the other with electric generation.

To use an illustration, the area to the left in the chart includes coal and ash handling equipment, boilers, flue dust collectors and smokestacks—facilities needed to burn coal and deliver steam to the turbine throttle valve. The area to the right includes the turbogenerator, condenser, pumps, and other equipment needed to convert steam received at the valve into electrical energy.

$158 per Kw . . . Estimates based on experience at Detroit Edison's new St. Clair plant indicate cost of steam generation facilities are $49 million, or $77 per kilowatt of capacity. For electric generation the cost is $51 million, or $81 per kilowatt.

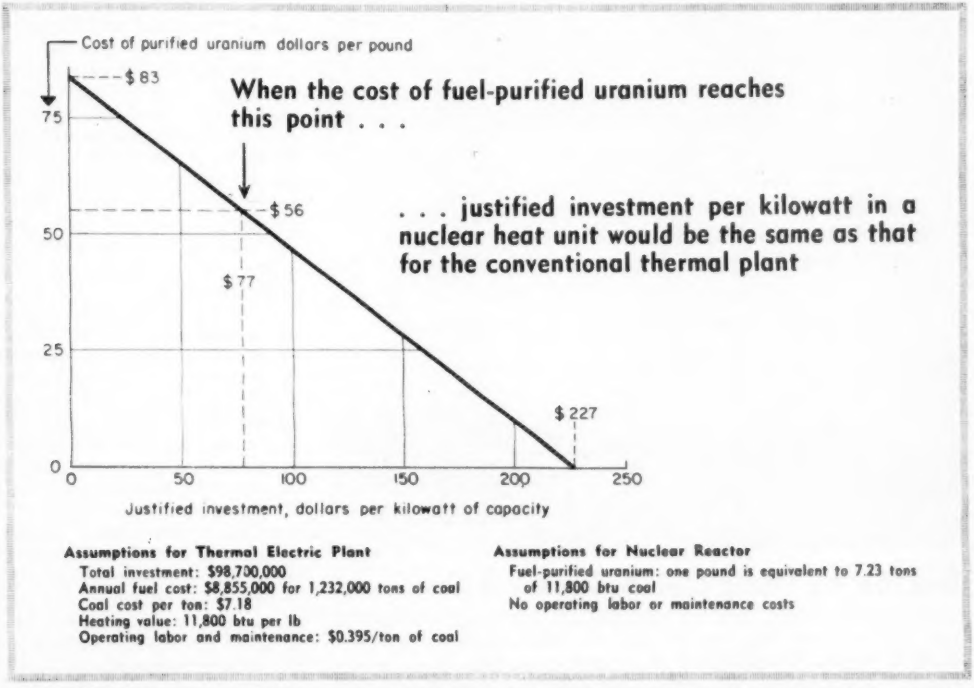
These figures show that the part of the station that might be replaced represents a little less than one-half the station's total cost. Based on-year-old data, the investment in steam generating facilities of Detroit Edison's four main thermal plants came to 17% of the company's total investment. Since the nuclear reactor can be substituted only for these facilities, only this comparatively small part of the total system's costs can be influenced by the substitution.

WALKER L. CISLER: "We, of course, are hopeful . . ."

A nuclear reactor, as has been said, would have to supply heat energy to the throttle at a cost no greater than the cost of heat from a conventional source. With this in mind, Detroit Edison investigators determined that annual operating cost of steam-producing equipment in the 625,000-kw St. Clair plant would be $14,171,300. This amounts to 57.7¢ a million btu delivered at the throttle valve.

Ideally, installation of a nuclear reactor would cut operating costs to nothing. Assuming no fuel or other operating expense after the initial investment, the amount that might justifiably be spent can be arrived at by capitalizing operating costs for the conventional steam unit at 10%. Theoretically, then, the company could spend $141,713,000—or $227 per kilowatt—on a nuclear reactor that would deliver one million btu of heat energy at the throttle valve at a cost of 57.7¢.

Upper Limit . . . For Detroit Edison, $227 per kw would be the economic


Cost of purified uranium dollars per pound
$83
75
When the cost of fuel-purified uranium reaches this point . . .
$56
50
. . . justified investment per kilowatt in a nuclear heat unit would be the same as that for the conventional thermal plant
$77
25
$227
0
0
50
100
150
200
250
Justified investment, dollars per kilowatt of capacity
Assumptions for Thermal Electric Plant
Total investment: $98,700,000
Annual fuel cost: $8,855,000 for 1,232,000 tons of coal
Coal cost per ton: $7.18
Heating value: 11,800 btu per lb
Operating labor and maintenance: $0.395/ton of coal
Assumptions for Nuclear Reactor
Fuel-purified uranium: one pound is equivalent to 7.23 tons of 11,800 btu coal
No operating labor or maintenance costs

JUSTIFIED INVESTMENT in a nuclear heat-power reactor and accompanying equipment. Chart is based on a plant operating at 625,000 kw capability at 70% annual plant factor and with various fuel costs. It was prepared by the Detroit Edison Co

limit of investment in a nuclear plant, because if the initial investment exceeded this amount, cost of heat at the turbine throttle would be more than that produced by conventional means.

Of course, it would not be possible to build a heat power reactor with no fuel costs or operational expenses. The straight line graph (p 107) was designed by Detroit Edison to show how justified investment would change if the ideal condition of no fuel cost could not be realized.

It was assumed for the study that purified uranium would be the fuel used. If this could be had at no cost, then the $227 investment would be justified. Justified investment would decrease with increasing cost of the uranium. When that cost reached $56 a pound, investment could be only $77 per kw, the same as for a conventional thermal plant. If uranium cost as much as $83 a pound, no investment at all could be justified.

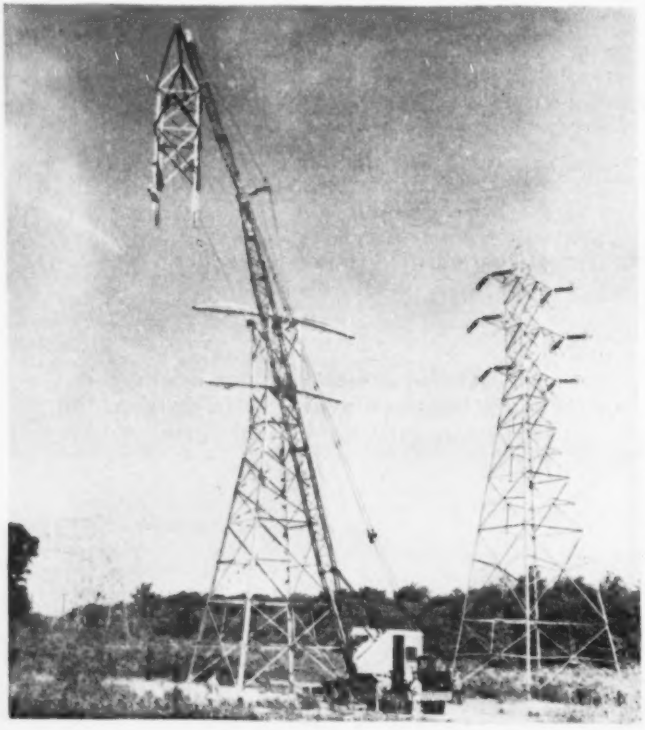
What type of reactor would be useful in an electric power system? Cisler said it would be one:

- for which fuel resources are not restricted
- that uses low fuel cost material
- the capital costs of which are low
- that has small exclusion area requirements (The conventional power plant requires 100 acres; a reactor plant might require, under present limitations, 100,000 acres).

"We, of course, are hopeful we can develop such a reactor," he said.

This new source of heat energy, the power company president said, probably will be used first in plants that have yet to be built, rather than as a substitute for steam-producing units in existing plants.

"I believe," he commented, "that the plants which are now in operation or under construction will serve their useful economic life before they will be superseded by another energy source. And even if atomic energy is developed with unexpected rapidity, it will affect only a part of the existing plant."



Boston to Walpole: A Tower a Day

Tall crane makes possible fast construction of a new Boston Edison Co tie line. The 110-kv line runs from the company's Edgar Station in North Weymouth to Walpole, 20 miles away. It parallels the existing 110-kv tie from Edgar to Millbury (right). The new line, to be operated ultimately at 220-kv, will be part of a multi-company grid serving southeastern Massachusetts.

Nevada Bid to AEC

Mining outfit wants one of those nuclear power plants, once they come on the market

A mining concern operating in Nevada is angling for one of the first nuclear-fueled electric power plants—when they come on the market.

Eureka Mining Corp Ltd, a Canadian firm with a chunk of mining properties in Nevada, has already discussed the matter with Dr Lawrence R. Hafstad, director of reactor development for the Atomic Energy Commission. Other AEC staff members are looking into the possibility of locating an atomic power plant in Nevada.

The argument put up by Eureka and other Nevadans runs like this:

Mining operations requiring large amounts of electricity are usually isolated from regular central station power plants. They must depend on high-cost fuel transported over long distances to run their generating plants. This sort of situation is a natural test spot for atomic-powered generating plants which cannot compete with central station power, but may be able to compete with small generating plants.

Overriding drawback to the proposition is there simply are no nuclear-fueled generating plants yet developed by AEC suitable for practical use. Or if there are, AEC hasn't given the slightest hint of it. The agency does have underway a long-range study looking toward the development of such plants, but actual working models still appear several years away.

But this has not deterred Nevadans from putting in their bid for one of the first nuclear-fueled plants. An "Atomic Power Utilization Committee" has been created in the state. Republican Sen George Malone of Nevada, a former mining engineer, has been working actively in Washington to arouse AEC interest.

Southern Utilities Beating the Drought

Steam generation is stepped up to make up for lower hydroelectric production and keep reservoir levels high

Drought conditions have cut sharply into hydroelectric generation in the South. Several southern utility systems reported hydro operations at the lowest point in more than a decade.

The prolonged dry spell, however, has caused virtually no load shedding. The deficiency in hydro is being met by stepped up production of steam-generated power. The switch to steam also is being made to keep water levels in the reservoirs reasonably high to meet increasing power demands this fall.

No Serious Deficiency . . . Defense Electric Power Administration said it did not expect any serious area-wide power supply problem in the Southeast this year unless the drought continued for a long period. There will be some local problems, says Depa, but there is little prospect of any power supply deficiency of national significance.

A Depa spokesman reported late last week that several interruptible loads had been dropped as a result of the drought, but these loads depended on lower-cost hydro power. There is still plenty of power available in the dry area, but most of it is the more expensive steam power.

Here are the results of a check Electrical World made on conditions at individual utilities in the South.

Southern Co . . . Hydro generation during July was the lowest since 1935 for Southern Co's two operating subsidiaries, Georgia Power Co and Alabama Power Co. The figure for the two companies was 157 million kwhr compared with 196 million kwhr for July 1951, and a 16-year July average of 226 million.

The July figures for each company break down this way: Alabama Power, 104 million kwhr for 1952, 135 million for 1951, and average 144 million: Georgia Power, 53 million for 1952, 61 million for 1951, and average 82 million.

Despite low hydro output during the summer months, water power generated for the first seven months of 1952 by Georgia Power and Alabama Power was well ahead of production for a similar period last year. The two companies have produced 2,267 million kwhr through July of this year compared with 1,796 million for the first seven months of 1951 and an average seven-months generation of 1,973 million.

Storage Normal . . . Hydro storage at Southern Co reservoirs was reported as normal for this time of year although rainfall in the watershed area during July was 10 to 50% of normal.

Neither Georgia Power nor Alabama Power expects to have to curtail load. Hydro deficiencies are being met by increased steam generation. The Southern Co system placed 155,000 kw of new capacity in service in July and this has made up for lower hydro generation.

Southern Co also has decreased its sales to other systems. Sales in July amounted to 50 million kwhr as compared with 95 million kwhr in May. Small power purchases at peak periods are being made from other systems.

TVA . . . Tennessee Valley Authority called the current dry spell "the worst early summer drought to occur since TVA began operations." The average rainfall in the valley during the four months of April through July was only 12 inches—compared with the normal rainfall of 18 inches.

To avoid lowering reservoir levels too fast hydro power from the dams is being supplemented by more power from TVA steam plants and more power purchased from other systems. This is increasing TVA's operating expenses at a rapid rate, G. O. Wessenauer, TVA's manager of power, reported.

But through use of units which recently came on the line at the Johnsonville and Widows Creek steam plants, TVA is meeting the needs of all its customers. There have been no cuts in power to "interruptible" customers, but TVA is eyeing this possibility if the drought continues.

Carolina P&L . . . Carolina Power & Light Co reported its hydro operations for this time of year have hit a new low because of the drought. During July CP&L plants turned out only 29.5 million kwhr—some 3 million kwhr less than the previous low for that month. Last year, which was considered a dry one in North Carolina, CP&L hydro plants produced 43.8 million kwhr during July.

To add to CP&L's drought problems, it had drained one of its larger reservoirs this summer to repair the intake structure. That one is all but bone dry. Water level at two other reservoirs is good, but only because the facilities have not been used for power production this summer.

The hot weather, with resultant increase in air conditioning, also sent peak-load to a record high of 609,000 kw. Peak usually occurs in winter.

South Carolina E&G . . . South Carolina Electric & Gas Co also reported lower hydro output. Stream flow in its area was only 50-60% of normal. Again steam generation was taking up the slack.

Santee Cooper . . . Of all the systems contacted only South Carolina Public Service Authority (Santee Cooper) said its hydro production was normal. Reservoir elevations for this time of year were reported normal. Trouble was expected, however, if the drought continued for several weeks more.

New Mexico Site Bought for Co-op Steam Plant

Forty-seven acres of land have been purchased at Algadones, N. M., 25 miles north of Albuquerque, for a $10-million steam generation plant to serve seven cooperatives in northern New Mexico and southern Colorado.

Plains Electric Generating Co, which will operate the plant, has obtained a Rural Electrification Administration loan of $5,835,000 to construct the plant, and another loan of $3,210,000 for power lines.

The project had been opposed by Public Service Co of New Mexico, which claimed that its present facilities, plus additional capacity under construction and established power lines, would do the job more economically.

Two Steps Toward the St. Lawrence

● Federal Power Commission has agreed to reconsider New York Power Authority's application to build the U. S. portion of the power project

● International Joint Commission, whose decision will be final, has begun hearings as to whether the international dam should be constructed

The newly launched drive to clear the way for construction of the St. Lawrence project rode calm seas last week, but some rough water was still ahead.

Now that Congress has given the project the cold treatment, Canada plans to build navigation segments of the project by herself. The United States, through the Administration, will cooperate in building the 1.4 million kw power development, which is vital to the overall development.

Federal Power Commission has agreed to reconsider the application of the Power Authority of the State of New York for a license to build and operate the share of the power development on the U. S. side of the border. This application was turned down by FPC in 1950 on the grounds that Congress should decide how this country would participate in the seaway project. The New York agency appealed the decision to the courts, where the case has been pending for more than a year.

Seeks Review . . . Early this month FPC joined with the New York Power Authority in asking the Federal Court of Appeals in Washington to dismiss the case and remand the application to FPC.

Meanwhile in upper New York State near the site of the proposed power development, the International Joint Commission has heard a long parade of witnesses urge that the power project be built promptly. IJC is the final authority on construction of the power development as currently proposed.

The move to reconsider the application of the New York agency came after Congress had again declined to approve federal participation in all parts of the seaway project.

New York Gov Thomas E. Dewey hailed the move as an indication "we are at last making real progress with New York's great program of developing the St. Lawrence river for cheap water power."

Presidential OK . . . The FPC action also had the endorsement of President Truman who promised early this year that he would assure the U. S. cooperation needed to carry the project along, even though Congress failed to vote full participation.

However, federal officials warn that reconsideration of the New York application does not mean the FPC decision will be summarily reversed. It could easily happen that the five-man commission will again drop the matter right back into the lap of Congress. This will depend, to some extent, on the political situation that develops in connection with the license.

The Truman Administration has said emphatically that it favors construction of the project, but it has also indicated that it favors federal construction of the U. S. share of the power development. Whether Democrats, both within and outside the Administration, will go along in turning the power development over to the Dewey administration in New York is the real question.

Two primary obstacles now appear to the granting of a license to the New York Power Authority. These are:

● Can the State of New York accept a license on a power project if the license provides that the project may eventually be taken over by the federal government?

● Will the present administration in New York accept certain conditions of the license such as a "preference clause."

Constitution of New York prohibits the alienation of any property held by the state. Licenses granted by FPC are usually for period of 50 years and set forth a formula for fixing an acquisition price on the project upon expiration of the license.

Question, then, is whether the acquisition formula portends actual acquisition of the licensed property by the federal government. And, further, whether this conflicts with the state constitution. One federal official familiar with the Federal Power Act believes further legislation is required to permit the government actually to take over the licensed property, and he sees no reason at this time for the question to enter the picture.

Second potential obstacle is whether Governor Dewey will accept certain conditions attached to the license if it is granted. Some powerful New York politicians, such as Democratic Sen Herbert H. Lehman, are known to favor a preference clause. This would give public agencies and cooperatives top priority in obtaining power produced by the St. Lawrence Project.

Break Precedent? . . . FPC would have to break with tradition to attach a preference clause to the license. Whether it will do this depends upon the arguments that can be made in behalf of the clause. But Governor Dewey possibly may have to deal with this and other conditions if and when a license is issued.

Once the court of appeals has remanded the case to FPC, the agency will schedule hearings, probably in September. With other routine procedure required by FPC regulation, it will probably be early next year before the commission can give a final decision on the New York Power Authority application.

Lack of Funds Will Slow New England Survey's Pace

Water resources survey for the New York-New England area, being carried on by a federal interagency river basin committee, will proceed at about half pace this fiscal year.

Army Corps of Engineers asked for $800,000 for the survey this year —received only $410,000 from Congress. Interior Department asked for $50,000 to make a power study of the area as its share of the interagency survey. Congress, for the

second time, turned down the request.

The survey was begun in October 1950 and is supposed to be completed by June 30, 1954. A spokesman for the Corps of Engineers said the completion date is still unchanged, but the reduced funds approved by Congress will result in a less detailed survey than was originally planned.

Six government agencies had obligated some $4.5 million for this survey up until June 30th of this year. Interior Department spent most of this on routine work, much of which would have been carried on even if the survey had not been undertaken. The Interior work includes surveys, mapping and other activities designed to assemble basic data for water resources study.

Co-op Seeks to Establish 1st PUD in Arkansas

Farmers Electric Co-operative Corporation is seeking to create the first public utility district in Arkansas, with power to purchase all existing electric utility property in Jackson County. Petitions were circulated at the annual membership meeting of the Farmers Co-op at Newport, Ark., last month.

An official of the Farmers Co-op said that the 634 signatures required to place the proposal on the Nov. 4 general election ballot were obtained at the meeting.

The petition also called for the power to purchase the Rural Electrification Administration co-op's facilities and those of two private power companies, Arkansas Power & Light and Citizens Light & Power Co, Tuckerman, Ark., in Jackson County.

The district would have authority to generate its own electricity and to own and operate a county-wide distribution system.

Farmers Co-op, by its new proposal, renewed a long-standing battle with Arkansas Power & Light. The co-op recently lost a Supreme Court decision to the private concern. The courts ruled against the co-op on the question of who was to serve an area that was added to AP&L territory that the co-op claimed to have developed. The utility in late July asked Public Service Commission authority to make the purchase.

AP&L meanwhile moved toward purchase of another power and light company in Jackson County, Swifton Power & Light Co.

PUD's Undecided on Purchase

Whatcom County's delay in joining six other Washington districts in acquisition of Puget Sound P&L causes uncertainty

With the Whatcom County PUD of Bellingham, Wash., slow to join six other PUD's in a $115-million purchase of the Puget Sound Power & Light Co, the other PUD's are undecided whether to wait for Whatcom, go ahead collectively, or go ahead individually.

The latter decision would mean pressing condemnation suits which the PUD's and many cities have pending against Puget Power properties in the various counties, a decision which would be heartily opposed by Frank McLaughlin, Puget Power president.

The Whatcom PUD refused to comply with the request of the other PUD's that it reach a decision by a specified date, now past. It replied that it is making sincere efforts to obtain competent engineers to study the purchase proposal, as well as the properties involved, and recommend whether Whatcom should join with the other PUD's or take independent action. Two engineers still are under consideration to make the survey, four others having been ruled out because of previous association with Puget Power. Whatcom wants to be convinced no federal agency will be controlling the PUD's in their actions.

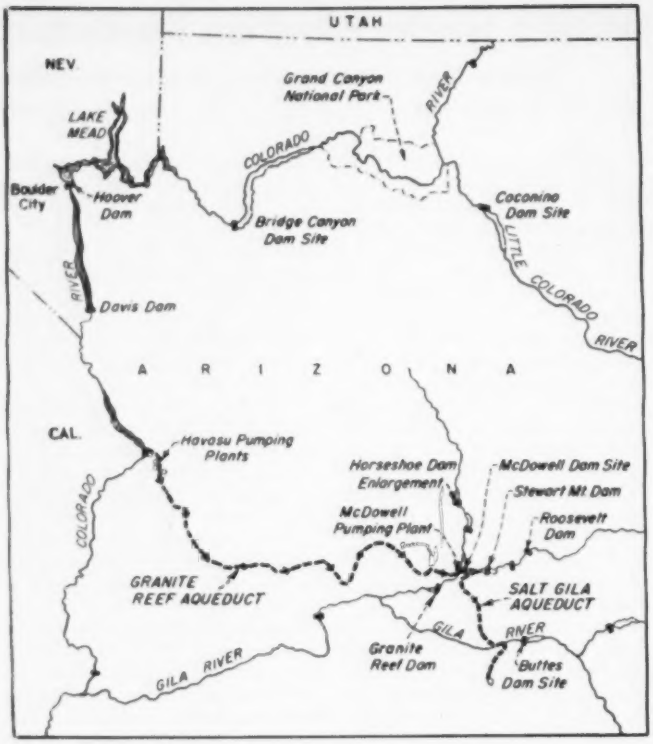
Whatcom's liability in the purchase pool would be about $25 million.

McLaughlin's Views . . . "The real victims in this stalemate," pointed out Puget Power's McLaughlin, "are the people in Puget Power's service area. Puget Power is unable to finance expansion and the power shortage here becomes more acute all the time. Under the overall acquisition plan, in which Whatcom has so far refused to go along, the seven districts could retain control of Puget's generating and transmission facilities, operate them as an integrated unit, and immediately proceed to expand Puget's Baker River and White River hydroelectric plants to provide around 110,000 kw of additional capacity. . . .

"Such an acquisition also would make possible the construction of other new power supply facilities as circumstances warrant. Furthermore, such an overall acquisition would maintain the independence of the power generating and transmission facilities against the invasion of the federal government through the Bonneville Power Administration."

Here Will Rise the Palisades Dam

Bureau of Reclamation's largest earth-fill dam, begun this spring, will crest at the level of the white line in the picture. When it is finished, the installation will provide 114,000 kw of power and supplemental water for irrigation. A portion of a relocated highway is seen at right, winding along the Snake River.



CENTRAL ARIZONA PROJECT is the place where . . .

2 States Fight on Water Rights

Arizona presses for irrigation and power project on Colorado River. California voices strong objections

Long-smoldering fight between Arizona and California over water rights on the Colorado River has erupted again. This time an Arizona state agency, with encouragement from Interior Department, is attempting to revive a portion of the giant $750-million Central Arizona Power and Irrigation Project (see map).

Interior Department announced July 28 it had granted rights-of-way across public lands to Arizona Interstate Stream Commission for construction of the 240-mile Granite Reef Aqueduct. At the same time Interior Secretary Oscar L. Chapman said he would consider Reclamation Bureau construction of the 750,000-kw Bridge Canyon Dam if and when the state offers to finance this portion of the project.

The move caught opponents of the Arizona project off guard, but not unprepared. Californians, headed by their Congressmen, moved in. Sen William F. Knowland, California Republican, immediately asked Interior to clarify its action by answering a number of questions on the action.

Shocked at Chapman . . . Democratic Rep Harry R. Sheppard of California issued a statement saying, "I am thoroughly shocked that Secretary Chapman would even remotely attempt a movement of this character with the Congress in adjournment."

Joseph Jensen, chairman of the Metropolitan Water District of Southern California said, "This arbitrary action brings home the lesson that Arizona is not giving up its water grab plans."

There was a feeling among the opposition that the move was mainly for short-range political reasons. In announcing the move, Interior had noted that Arizona Democratic Sen Ernest McFarland, who is up for re-election this year, had been instrumental in obtaining the rights-of-way for the aqueduct.

The aqueduct and dam are the vital parts of the project to bring water to central Arizona and supply electric power for irrigation and commercial use. Twice Congress has failed to authorize the project, although the Senate both times approved it.

One-third of the power produced from the proposed Bridge Canyon Dam would be used to raise water some 1,000 ft out of the Colorado to the head of the aqueduct. Without the hydroelectric dam and sufficient pumping facilities, the aqueduct would be useless.

Legal Problem . . . Real problem facing the Arizona venture is whether the state is legally entitled to the amount of water needed to make the aqueduct feasible. California has long insisted that it has valid claim to the water which Arizona proposes to use in connection with the irrigation project. Efforts by California to have the Supreme Court settle this dispute have never succeeded.

Reason for lack of a judicial settlement on the water rights dispute is the federal government would have to be a party in the suit, and thus far Congress has not granted this permission.

It may be that the most recent activity by the Arizona agency is for the purpose of laying ground work for a final judicial settlement of the water right dispute. Previously the Interior Department has recognized that the Arizona project depends solely on whether the state is entitled to sufficient water to make the project work.

No Mention of Dispute . . . In granting rights-of-way over public lands for the aqueduct, Interior made no mention of the all-important water rights dispute.

Cost of constructing the aqueduct and related pumping facilities was estimated in 1947 to be about $156 million.

Construction of Bridge Canyon Dam and power plant could be operated independently of the Central Arizona Irrigation Project. Estimated cost in 1947 was $270 million.

POWER BRIEFS

● Two communities in Michigan face loss of power in 1954 if new arrangements to serve them are not worked out by then. The Cliffs Power & Light Co has announced it will stop providing power to Ishpeming and Munising Jan 1, 1954 when its contract expires because it will lack the power to serve new mining operations there. Cliffs P&L sells the power to Michigan Gas & Electric Co, which resells it in the two towns.

● Westinghouse Electric Corp will begin work on the development of an atomic power plant "suitable for the propulsion of large naval vessels such as aircraft carriers." Atomic Energy Commission modified its contract with the company to permit this work in addition to work on an atomic power plant for a submarine.

● Construction workers on the Limberg Dam in the Hone Tauern Mountains near Kaprun in Austria will have music to calm their nerves during part of their working hours. Working 11 hours a day for technical reasons, the men will be soothed with light music after 8 hours of work to cut down accidents. When completed Limberg Dam will be the largest in Europe.

● Quebec will construct a 500,000-hp dam costing $100 million on Bersimis River in the northern part of the province. The dam is expected to be completed in 1956. The project involves laying cables under the St. Lawrence River to a point on the south shore 48 miles from the proposed power plant. The Bersimis River empties into the St. Lawrence.

● National Production Authority has allocated material for a new $1,538,000 headquarters building for Public Service Co of Indiana at Columbus, Ind., and a $271,500 administration building for Indianapolis Power & Light Co. Public Service's building will be located on a 20-acre site and will house engineering and accounting supervisors, construction headquarters, and service maintenance employees serving the southeastern portion of the state.

● Portland General Electric Co's remodernized hydroelectric plant at Willamette Falls, Oregon City, Ore., will be named Sullivan Plant in honor of the late T. W. Sullivan, engineer who supervised much of the development. The plant is now known as Station B. Remodernization work will increase the plant's capacity from 5,000 to 15,000 kw.

● Mayor Allan Pomeroy has begun an investigation of Seattle City Light. Seattle's mayor has refused to comment on the purpose of the investigation but announced he has "been giving a great deal of consideration to the City Light picture." The announcement came in a letter to the City Council returning unsigned an ordinance appropriating funds for City Light. The ordinance was not vetoed, and thus became effective without the mayor's signature.

● Bayfield Electric Cooperative, Iron River, Wis., has finally discovered the cause of recurring outages in the area south of Grand View. The co-op was stumped by the disruptions which usually occurred around noon on hot days until it came across a horse with an itchy back. It turned out that on hot days the horse rubbed his back on a guy wire, causing the lines to slap together and interrupt service to the area.

● Citizens of Elkader, Iowa, last month approved a 25-year franchise for Interstate Power Co by a vote of 382 to 284.

CALENDAR OF COMING EVENTS

American Institute of Electrical Engineers
Pacific General Meeting, Hotel Westward Ho, Phoenix, Ariz., Aug. 19-22; Middle Eastern District Meeting, Commodore Perry Hotel, Toledo, Ohio, Oct. 28-30.

***Institute of Radio Engineers**
Joint Telemetering Conference with American Institute of Electrical Engineers, Lafayette Hotel, Long Beach, Calif., Aug. 26-27; Joint Computers Conference with AIEE, Park Sheraton Hotel, New York, Dec. 10-12.

Centennial of Engineering
Convocation, Chicago, Ill., Sept. 3-13.

***Michigan Municipal Utilities Association**
Annual Convention, Charlevoix Beach Hotel, Charlevoix, Mich., Sept. 4-5.

Maryland Utilities Association
Cavalier Hotel, Virginia Beach, Va., Sept. 5-6.

Rocky Mountain Electrical League
Fall Convention, Colorado Hotel, Glenwood Springs, Colo., Sept. 7-10.

American Standards Association
National Standardization Conference in conjunction with Centennial of Engineering, Museum of Science-Industry, Chicago, Ill., Sept. 8-10; 34th Annual Meeting, Waldorf-Astoria Hotel, New York, Nov. 19.

Edison Electric Institute
Area Development Institute, Yale University, New Haven, Conn., Sept. 8-10; Accident Prevention Committee, Sheraton Hotel, Rochester, N. Y., Sept. 15-16; Prime Movers Committee, Roosevelt Hotel, New Orleans, La., Oct. 6-7; AEIC joint meeting, Meter-Service Committees, Mayflower Hotel, Washington, D. C., Oct. 6-8; Electrical Equipment Committee, Roosevelt Hotel, New York, Oct. 13-14; Transmission - Distribution Committee, Hotel Adolphus, Dallas, Tex., Oct. 23-24.

American Society of Mechanical Engineers
Fall Meeting, Sheraton Hotel, Chicago, Ill., Sept. 8-11.

Illuminating Engineering Society
National Technical Conference, Edgewater Beach Hotel, Chicago, Ill., Sept. 8-12.

Instrument Society of America
7th National Instrument Conference-Exhibit, Cleveland Auditorium, Cleveland, Ohio, Sept. 8-12.

***Pennsylvania Electric Association**
Annual Meeting, William Penn Hotel, Pittsburgh, Pa., Sept. 16-17; Fall Meeting, Electrical Equipment Committee, Irem Temple Country Club, Dallas, Pa., Oct. 2-3; Fall Meeting, Systems Operation Committee, Hotel Roosevelt, Pittsburgh, Oct. 16-17; Fall Meeting, Meter Committee, Fort Stanwix Hotel, Johnstown, Pa., Oct. 23-24; Fall Meeting, Relay Committee, Robert Treat Hotel, Newark, N. J., Nov. 13-14.

Northwest Public Power Association
Accounting Section, Congress Hotel, Portland, Ore., Sept. 15-19.

Public Information Program
Annual Workshop Conference, Edgewater Beach Hotel, Chicago, Ill., Sept. 18-19.

Public Utilities Association of the Virginias
Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 19-20.

Southeastern Electric Exchange
Fall Meeting, Engineering-Operation Section, Atlanta Biltmore Hotel, Atlanta, Ga., Sept. 25-26; Accounting Conference, Jung Hotel, New Orleans, La., Oct. 16-17; Sales Conference, Thomas Jefferson Hotel, Birmingham, Ala., Oct. 29-31.

***Missouri Valley Electric Association**
Accounting Conference, Hotel President, Kansas City, Mo., Sept. 29-30; Sales-Rural Conference, Hotel President, Kansas City, Mo., Oct. 8-10.

National Electronics Conference
8th Annual Conference, Sherman Hotel, Chicago, Ill., Sept. 29-30 and Oct. 1.

***California Municipal Utilities Association**
20th Annual Conference, U. S. Grant Hotel, San Diego, Sept. 30-Oct. 3.

Wisconsin Utilities Association
Convention of Technical-Sales Sections, Schroeder Hotel, Milwaukee, Wis., Oct. 1-3.

***International Association of Electrical Leagues**
17th Annual Conference, Radisson Hotel, Minneapolis, Minn., Oct. 1-4.

Iowa Utilities Association
Management Conference, Fort Des Moines Hotel, Des Moines, Oct. 6-7.

***University of Texas**
Power Distribution Conference, Department of Electrical Engineering, Austin, Oct. 6-8.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 8-10.

National Farm Electrification Conference
Statler Hotel, Detroit, Mich., Oct. 20-21.

National Association of Railroad and Utilities Commissioners
Annual Meeting, Hotel Marion, Little Rock, Ark., Nov. 10-13.

National Electrical Manufacturers Association
Annual Meeting, Haddon Hall Hotel, Atlantic City, N. J., Nov. 10-13.

***Addition this week.**

'New Money' Financing Sets Record

Companies take advantage of favorable equity market to help finance expansion

High volume of new electric utility construction was matched by record public offerings of new money securities, passing the billion dollar mark during the first half of 1952. Nearly $100 million worth of bonds and preferred stocks also were sold privately. Steady prices in the security markets paved the way for the generally successful financing of previously scheduled expansion programs.

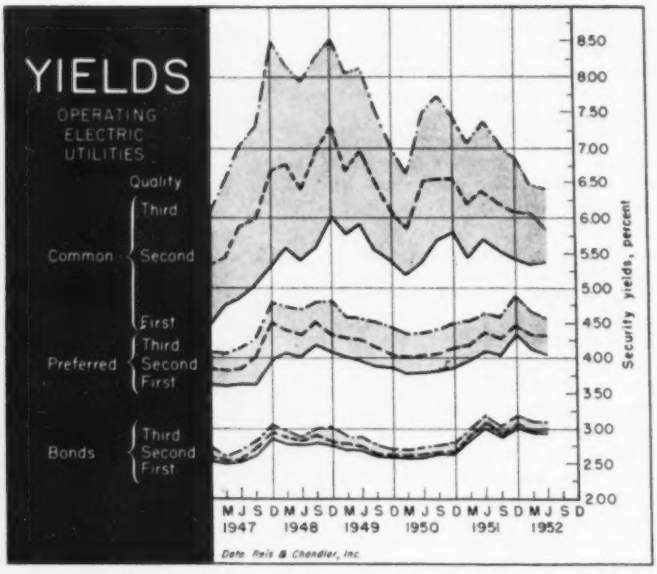
New Money Financing Up . . . The volume of public financing for "new money" during the first six months of 1952 was about 85% of "new money" financing during the entire years 1949 and 1951 and slightly above the 1950 total. In the earlier years lower debt costs made refunding more attractive. Security sales in June alone came to nearly a third of the six months total. In size, Pacific Gas & Electric Co topped the bond and common stock lists. The Irving Trust Co has estimated that financing of the electric industry's projected expansion program for 1952 is now more than 60% completed.

The heavy June schedule sent prices of new debt issues down (yields up) and selective buying left underwriters with an inventory estimated at around $35 million at the close of the half year. However, they were reluctant to establish a free market in these issues when chances were good that the bonds would move during the traditionally quiet summer months.

Preferred Stock Sales Up . . . First half sales of new preferred stock issues, while less in total than the last half of 1951 were considerably above the first six months of last year. There were twelve issues sold to the public excluding one convertible issue. Yields based on public offering prices ranged from 5.25% at the beginning of the year to 4.14% for an offering made the last of May. The average yield approximated 4.55%.

Electrical World's bond yield indices on outstanding issues declined slightly during the first six months of 1952, with the greatest fall (.12%) in the lowest quality category, thus narrowing the spread between the highest and lowest rated issues. However, prices of these corporate bonds showed greater stability than prices in the long-term government market. The yield of U. S. Treasury 2½s, due 1967-1972 fell 0.13% and ended the half year selling on a 2.62% basis. The record low price (highest yield) for this issue since issuance in late 1945 was made in January, 1952.

The preferred stock market firmed during the first quarter and little change took place during the second quarter as can be noted from the accompanying chart.



SECURITY YIELDS were mixed for second quarter of 1952. Third quality yields of bonds, preferred and common stocks went down, indicating higher market prices for these securities

Record High for Common . . . Utility common stocks reached a 21-year high at 50.44 as measured by the Dow-Jones averages and closed the half year at 49.66. Last year's high of 47.22 was attained on Dec. 31. The

Public Offerings—Electric Utility Securities
(Thousands of Dollars)

	First Half of 1952			First Half of 1951		
	New Money	Other	Total	New Money	Other	Total
Bonds, Notes, and Debentures	637,559	.....	637,559	460,234	9,866	470,100
Preferred Stocks	107,868	.....	107,868	25,660	.....	25,660
Common Stocks	329,586	5,601	335,187	226,689	.....	226,689
Total	**1,075,013**	**5,601**	**1,080,614**	**712,583**	**9,866**	**722,449**
	First Quarter of 1952			**First Quarter of 1951**		
Bonds, Notes, and Debentures	295,800	.....	295,800	238,634	9,866	248,500
Preferred Stock	60,983	.....	60,983	23,660	.....	23,660
Common Stocks	80,347	5,601	85,948	120,585	.....	120,585
Total	**437,130**	**5,601**	**442,731**	**382,879**	**9,866**	**392,745**
	Second Quarter of 1952			**Second Quarter of 1951**		
Bonds, Notes, and Debentures	341,759	.....	341,759	221,600	.....	221,600
Preferred Stock	46,885	.....	46,885	2,000	.....	2,000
Common Stocks	249,239	.....	249,239	106,104	.....	106,104
Total	**637,883**	.....	**637,883**	**329,704**	.....	**329,704**

increase of 5% over the year-end in this average compares with a 2% gain in the industrial average and a 26% advance recorded by the rails. This latter group also set a 21-year high at the close of June. A good many utility companies took advantage of the strong equity markets to finance new construction through the sale of junior securities and common stock offerings. For the first six months they were nearly up to the 1951 yearly volume.

Reasons for the upward trend of common stock prices may be found in the higher level of electric company earnings and more liberal dividend disbursements this year as compared with last year.

Net Income Higher . . . Based on Federal Power Commission reports of Class A and B privately owned electric utilities in the United States, gross income available for interest and dividend payments during the first five months of 1952 averaged 10% higher than last year. Likewise net income available for common dividends was nearly 12% above the first five months a year ago. It should be borne in mind however that net utility plant is also averaging some 10% more than last year requiring higher capital charges, and issuance of more common shares, so that broadly speaking to avoid dilution, common earnings must gain at least 10% to maintain per share results.

% Increase 1952 over 1951

	Net Plant	Gross Income	Net Income	Net for Common*
Jan.	9.6%	12.4%	14.2%	15.0%
Feb.	10.2	8.0	9.6	9.6
Mar.	10.1	13.6	16.5	17.7
Apr.	10.2	7.3	7.3	7.0
May	10.3	9.3	12.2	12.8

* approximate

Higher Common Dividends . . . During the second quarter of the year electric companies increasing dividends included: Central Vermont Public Service Corp, Atlantic City Electric Co, Middle South Utilities, Central Hudson Gas & Electric Corp, Virginia Electric & Power Co, and Houston Lighting & Power Co. During the first half of 1952 some 17 utilities increased dividend rates compared with eight during the first six months of 1951. This trend appears to be continuing, in that during the first two weeks of July five additional companies announced more liberal payments to equity holders.

Today in Utility Finance

YIELDS (%)

Quality	Bonds 1st	Bonds 2nd	Bonds 3rd	Preferred Stocks 1st	Preferred Stocks 2nd	Preferred Stocks 3rd	Common Stocks 1st	Common Stocks 2nd	Common Stocks 3rd
DATE									
1952									
July 31	**2.96**	**3.00**	**3.13**	**4.06**	**4.26**	**4.62**	**5.34**	**5.75**	**6.23**
July 24	2.96	3.01	3.11	4.08	4.28	4.61	5.38	5.80	6.25
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42
1st 1952	2.95	2.99	3.13	4.11	4.29	4.60	5.35	6.03	6.47
4th 1951	3.02	3.07	3.21	4.32	4.50	4.91	5.42	6.18	6.84
3rd 1951	2.87	2.91	3.04	4.05	4.27	4.61	5.52	6.24	7.05

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months Ended		Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Arizona Public Service	12	June	$2,623,092	$2,042,412	$1.03(a)	$0.76(a)
California Oregon Power	12	June	2,347,610	2,410,401	....	....
Central Power & Light	12	June	4,429,288	4,240,897	....	....
Community Public Service	12	June	1,035,372	790,835	....	....
Consolidated Gas of Baltimore	12	June	9,286,534(c)	9,467,517(c)	1.66(b)	1.74(b)
Consumers Power	12	June	19,946,709	19,907,679	2.68(e)	2.95(e)
Dallas Power & Light	12	June	3,613,417	3,358,502	....	....
Electric Bond & Share	12	June	5,712,457	5,745,894(h)	1.09	....
Gulf States Utilities	12	June	6,449,241	5,875,046	1.64(f)	1.62(f)
Houston Lighting & Power	12	June	7,674,745	6,492,640	....	....
Kansas City Power & Light	12	June	5,055,617	4,576,848	....	....
Michigan Gas & Electric	12	June	443,035	423,694	2.80	2.65
New Jersey Power & Light	12	June	1,393,018	1,264,659	....	....
Philadelphia Electric and subsidiaries	12	June	27,173,547	26,040,031	2.18	2.08
Public Service Co of Oklahoma	12	June	4,447,907	3,877,678	....	....
Southwestern Gas & Electric	12	June	3,524,807	3,269,216	....	....
Texas Electric Service	12	June	7,569,201	5,669,107	....	....
Texas Power & Light	12	June	6,888,353	5,442,089	....	....
Tucson Gas, Electric L & P	12	June	1,087,302	889,008	2.02(g)	2.26(g)

Notes—(a) Based on shares outstanding at end of period; (b) Based on average number of shares out standing; (c) Usable flow of Susquehanna River was above average in second quarter of 1952 and, after federal normal and surtaxes, increased net income $107,000, while in second quarter of 1951 river flow was below average and decreased net income $34,000. In each year ended June 30, 1952 and June 30, 1951, usable river flow was above average and, after federal normal and surtaxes, increased net income $257,000 and $856,000, respectively; (e) Based on shares outstanding at end of each period; (f) Based on 3,124,168 shares in 1952 and 2,884,590 shares in 1951; (g) Based on 500,000 shares in 1952 and 360,000 shares in 1951; and (h) Includes $434,452 adjustment for prior year over-accrual of taxes.

FINANCING

Company and Description	Amount of Offering ($000)	Offering Price	Yield to Public
WEEK OF JULY 31–AUGUST 6			
Bonds			
Pennsylvania Electric—1st mtg 3¼% 1982	$9,500	100.47%	3.38%
Seattle, Wash., municipal light and revenue 1970–1987	25,000	various	*
Preferred Stock			
Pennsylvania Electric—45,000 sh 4.50% $100 par	$4,500	$102.27	4.40%
WEEK OF AUGUST 7–13			
Common Stock			
Mountain States Power—200,000 sh	.....	.....	.....
SCHEDULED FOR SEPTEMBER TO DECEMBER			**Bid Date**
Bonds			
Arkansas Power & Light—1st mtg 1982	$15,000	.....	Sept. 9
Appalachian Electric Power—1st mtg 1982	17,000	.....	Sept. 23
Utah Power & Light—1st mtg 1982	10,000	.....	Oct. 15
Carolina Power & Light—1st mtg 1982	20,000	.....	Oct. 20
New Orleans Public Service—1st mtg 1982	6,000	.....	Dec. 15
Notes			
Appalachian Electric Power—serial 1956–1967	$6,000	.....	Sept. 23
Common Stock			
Utah Power & Light—167,500 sh (to be offered to stockholders on 1-for-10 basis, record about Sept. 10 to expire Sept. 25; stockholders to be allowed over-subscription privileges)	$.....	.....	.....
UNSCHEDULED AND UNDER CONSIDERATION			
Bonds			
Washington Water Power—1st mtg 1982	$30,000	.....	.....
Virginia Electric & Power—1st mtg 1982	20,000	.....	.....
California Oregon Power—1st mtg 1982	7,000	.....	.....
Mississippi Power & Light—1st mtg 1982	8,000	.....	.....
Duquesne Light—1st mtg 1982	14,000	.....	.....
Preferred Stock			
Cleveland Electric Illuminating—100,000 sh $100 par	$10,000	.....	.....
Central Illinois Public Service—50,000 sh $100	5,000	.....	.....
Duquesne Light—140,000 sh $50 par	7,000	.....	.....
Common Stock			
California Electric Power—354,610 sh	.....	.....	.....
California Oregon Power—250,000 sh	.....	.....	.....

Note—*—At yields ranging from 2.33% to a dollar price of 98½ for those due in 1987.

PUBLIC RELATIONS & ADVERTISING

UP TO HIS SHIRT SLEEVES in orders for "More . . . And More . . . And More" is P. L. Smith, president of the National Association of Electric Companies. Booklet tells the story of the private companies' $18-billion expansion program and why federal power is not required

'More...And More...And More'

The nation's electric companies are furnishing power "where it is needed, as it is needed," P. L. Smith, president of the National Association of Electric Companies, declared in announcing the publication of a booklet, "More . . . And More . . . And More."

The booklet carries the data of the companies' $18-billion expansion program broken down by state and region. According to this statistical analysis the electric industry since 1946 has:

1. Already spent $10 billion to increase production capacity by 50%.

2. Committed another $8 billion which will result in a net increase in generating capacity by 1954 of 100%.

3. Made plans to triple capacity by 1960, assuming continued business growth.

Commenting on the industry's expansion figures, Smith pointed out that they become particularly significant when related to national power policy.

"Those who advocate greater and greater spending of taxpayer dollars for government power projects," he said, "often do so without regard to our nation's actual power needs or to the facts about the expansion plans of the electric companies. No industry in the history of our nation has ever invested so much in such a short time as have our individual electric companies since the last war. Their expansion efforts are providing power where it is needed, as it is needed to serve their customers."

He emphasized that the capital to achieve this continuing growth in energy potential is being provided either directly or indirectly by investments, large and small, of private citizens in all sections of the country.

Great development of electric capacity has occurred in the expanding areas of the South and West, the booklet points out. But every region of the country has shown tremendous growth. For example, even in the power-rich Middle Atlantic region approximately $1,620,000,000 has been spent since World War II to increase generating capacity of the electric companies from 10,347,000 to 13,944,000 kw.

By 1954 the electric companies of this region that produces approximately one-fourth of all U. S. power will have added another 4,160,000 kw, a nine-year postwar increase of 75%. Comparable increases in other areas include:

In New England, by 1954, a nine-year postwar increase of 95%; South Atlantic States, 108%; East North Central, 103%; East South Central, 162%; West North Central, 104%; West South Central, 237%; Rocky Mountain, 138%; and Pacific Coast, 118%.

Freedom Production Theater TV Schedule

Coming attractions on the television show, "Production for Freedom Theater," include:

Aug. 17—"On the Track." The Association of American Railroads tells the story of development of rail transportation in peace and war. Sharing the program will be "Silicones," General Electric's story of the development of silicone products for home and industry.

Aug. 24—"Walls without Welds." The United States Steel Corp tells the story of the manufacture of seamless steel pipes from ingot to finished product.

Aug. 31—"Magic Key." The Chamber of Commerce of the United States tells how advertising has helped spread labor-saving devices and comforts. And Dow Chemical Co tells about magnesium in "Treasure of the Sea."

Most American Broadcasting Co TV stations are carrying the half-hour program at 6 or 9:30 PM. Check local newspapers.

Florida P&L Tells How to 'Boss Your Wife'

"How to Boss Your Wife" is the title of a pamphlet of which 20,000 copies have been distributed by Florida Power & Light Co. The theme is courtesy and thoughtfulness. And the pamphlet is part of the courtesy campaign to win friends for the company and Florida.

Humorous approach taken is brought out by Rule 1:

Beat Her . . . to the punch. Anticipate her moods. Surprise her with unexpected gifts now and then. That's thoughtfulness.

A copy can be secured from Malcolm B. McDonald, director of advertising, Florida Power & Light Co, 25 SE Second Ave., Miami, Fla.

'Finer Carolina' Contest

Carolina Power & Light Co reports that 887 projects are underway in the 148 towns participating in its "Finer Carolina" contest. Over 30,000 non-company employees are involved.

What Are Utilities Doing in Home Lighting Promotion?

Data supplied by 152 companies show industry has not forgotten its first load builder but finds it difficult to measure costs and results

Home lighting promotion in recent years has been obscured by the vast amount of the industry's efforts to promote appliances. Lighting is "old stuff." Many of the appliances—TV receivers, clothes dryers, electric ranges, room coolers—are comparatively new. And utilities have always promoted the new. Yet they have not lost sight of the fact that the industry's first load builder is still worth promoting.

This is apparent from the results of a survey conducted by Electrical World. Questionnaires went to 177 companies. Replies came from 152, serving about 77% of the residential customers and replies are tabulated on pages 128 to 131. Perhaps the high percentage of replies received was due to cooperation of the Residential Lighting Committee of Edison Electric Institute and the Better Light Better Sight Bureau. Both of them aided in the preparation of the questionnaire and wrote utilities asking that they supply the data promptly.

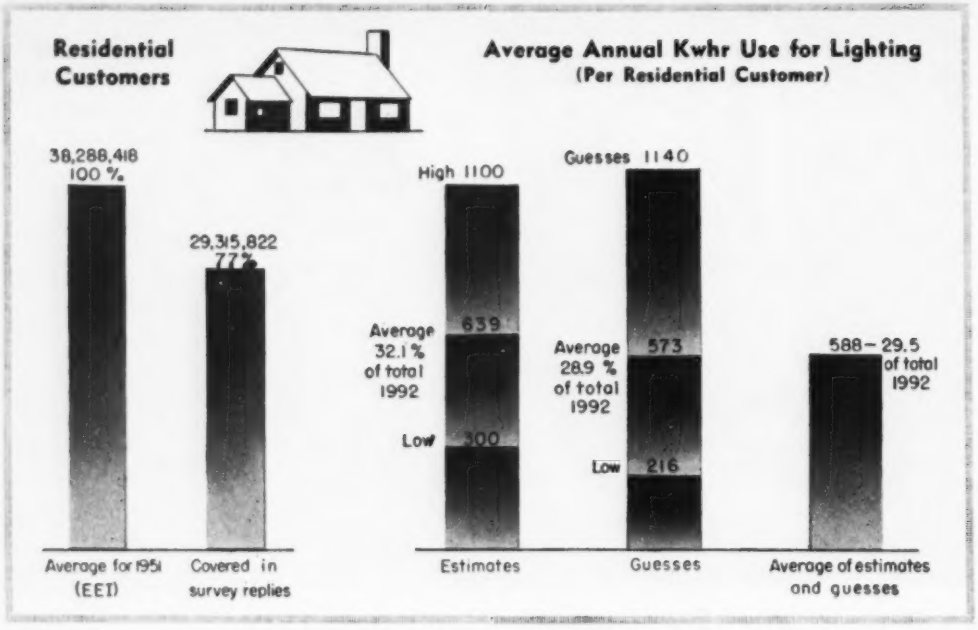
The data are undoubtedly as accurate as the companies could make them. This is difficult because the promotion of home lighting is often inseparably intermingled with other sales and promotional activities. But important as the data are, the interpretation of them offers an even more valuable contribution to the industry.

The industry does not know enough about what it is paying for and getting from home lighting promotion. A study of the replies indicates that lighting accounts for 30% of residential sales—a higher percentage if total use is small. Yet the sparse and vague replies as to amounts spent for promotion clearly point out that the companies don't quite know how much they are spending. Even fewer companies know their EAR per dollar of expense for such promotion. Yet the few replies received showed this figure to range from $1.22 to $4.31.

Though home service personnel devote time to lighting activities, there is no way of determing how much they do. Only 12 utilities have full-time workers in the lighting field. Nor are utilities working too closely with electrical dealers. This may be due to feeling on the part of utilities that they must rely on their own efforts to get results.

Bulb campaigns are the one bright spot in the lighting promotion picture. The companies know the results of these campaigns. This may be attributed to the ease in measuring costs, sales, and load gained.

All techniques of mass marketing are used to promote lighting. But again there is difficulty in allocating costs and results. In many cases lighting is promoted along with appliances and various company services. However, it is clear that newspaper advertising is the No. 1 medium.



Here Are the Survey Results

Study of electric utilities shows that most of them don't know what they are paying for and, after paying, what they are getting from home lighting promotion

Close to 77% of the industry in terms of residential service is represented in the results of this home lighting promotion survey. Of 177 utilities sent questionnaires 152 replied. These serve 29,315,822 of the nation's 38,288,418 residential customers served by electric utilities.

Average annual kwhr usage per residential customer as reported in the replies ranged from 6,451 to 1,148. Weighted by numbers of customers served by the respective utilities, the mean of these average usages is 1,992 kwhr, slightly under the 2,004 kwhr reported by Edison Electric Institute for 1951. This slight difference indicates that the survey is an accurate cross-section of the industry in respect to home lighting activities.

Not a Consistent Picture . . . How extensive and intensive such activities are throughout the industry is indicated, rather than stated, by replies to a question as to whether or not these activities are part of a continuing program or undertaken only occasionally. In the very nature of things, replies to this question do not constitute a consistent picture. What to one man would be a continuing program would appear to another to be only a sparse series of unrelated activities. The only replies that can be accepted as exact are those (18) that said nothing at all was being done in home lighting promotion.

However, from this negative side it follows logically that the utilities represented in the remainder of the replies (134) are doing something in the way of promotion. And the fact that 67 of these report continuing programs indicates that some at least are doing a really good job of it. This conclusion will be evidenced further in discussion of responses to other questions in the survey.

A survey made by the EEI Residential Lighting Committee, over a year before this one, reported 54 or 59.3% of 91 power companies actively promoting home lighting. Assuming that 134 or 88% of the 152 companies replying are "actively" promoting, it appears that appreciation of the revenue potential of home lighting has grown considerably in the short time between the surveys.

Kwhr for Home Lighting . . . Lighting is still the largest single use of electricity in the American home, despite the seven-league strides of appliance acceptance in recent years. In the case of customers whose kwhr consumptions are significantly below the national average, lighting uses by far most of the kwhr billed to them. Their bills do not extend to the lower steps of rate schedules. Thus lighting is comparatively high revenue business, and its contribution to total residential revenue is much greater than its

proportion in the total residential consumption.

For this reason the question, "How much electricity does the average residential customer use for lighting," is often asked. It is never answered quite satisfactorily. Usually the reply is based on calculations involving average consumptions of appliances and national saturations of them. The usage of appliances thus arrived at is subtracted from the average total usage and the remainder is taken for granted as the kwhr for lighting. Obviously the margin of error in such calculation is wide.

Estimates and Guesses . . . This survey attempted to reach a figure of average energy consumption for lighting in a different way. Respondents were asked to give estimates of average kwhr for lighting per residential customers on their lines. If no definite estimates had been made, they were asked to guess at the figure. Estimates were given in 34 replies and ranged from a high of 1,100 kwhr to a low of 300. The weighted average of them is 639 kwhr. The weighted average of guesses is 588 kwhr. This figure comes from 89 replies ranging from 1,140 kwhr down to 216.

Combining the estimates and the guesses into a third weighted average results in a figure of 588 kwhr. One is justified in doing this on the suspicion that the difference is slight between an estimate and a guess on use of electricity for lighting. Few, if any, utilities have made anything that can be called exact determination of such use of their service. Thus the final figure of 588 kwhr has no foundation of record or test data to support it. But it does have much more than questionable validity because it is the end result of figures supplied by 123 utilities.

Let's Say 30% . . . The weighted average of 1951 average kwhr use per residential customer reported in the 152 replies is 1,992 kwhr. The proportion used for lighting is 29.5%, accepting the figure of 588 kwhr for that use. Rounding off, one may say with some assurance that 30% of the electricity sold in residential service is used for lighting.

One question in the survey asked for the EAR per dollar of total expense for home lighting promotion in 1951. Responses to this question were very few and are not included in the detailed tabulation of replies on pages 128 to 131. They may be found in the tabulation, however, by the identifying numbers used in the following paragraphs.

No. 47, Delaware Power & Light Co, reported total expenses for home lighting promotion of $10,353 in 1951. The added revenue of $12,660 divided into the expense gives a cost of 82.2¢ per dollar EAR.

No. 86, Louisiana Power & Light Co, estimates $2 EAR per dollar of

FOR BETTER HOME LIGHTING—

Illuminating Engineering Society Works to Meet Visual and Aesthetic Needs

Since the war's end, the IES Residence Lighting Committee has increased the extent and breadth of its work. Its studies and reports began to aim for (1) a more realistic and less academic approach, (2) a more specific and less generalized expression, (3) a greater balance of emphasis on integration of the use, engineering, and artistic aspects.

The revitalized effort sprang from a realistic recognition of the many conditions which rob the great majority of homes of that first function of modern lighting—provision for the visual requirements of the family.

Two factors especially retard the progress in providing homes with this basic function.

First is the fact that qualified lighting specialists, except in isolated cases, do not counsel in planning the overall lighting of homes or in selecting their lighting equipment. Typically, advance plans (if any) and equipment selection are made by electrical contractor, builder, architect, interior designer, retailer, or homemaker. Lacking basic lighting knowledge in most cases, they have in fact no basis for appraisal of either lighting value or its potential contributions. (Even the specialist is dependent on studied experience or measurement with specialized instruments.) Accordingly other criteria, such as price, material qualities, form, scale, novelty, artistic or emotional appeal, or personal opinion serve for judgment and purchase, and thus quite naturally in high degree for manufacture. A merry-go-round of confusion! Everything goes, seemingly—especially if it's cheap, or beautiful to look at, or "utterly different."

Second, there are literally hundreds of relatively small manufacturers of residence fixtures and portable lamps. Too few have, for mass effectiveness, the required financial resources individually to develop acceptance of so radical, if rational, change in lines as the lighting idea impels. Few of these companies even have staff specialists or engineers to guide the overall design of their "lighting" products. But some of the large companies are making remarkable progress in combining quality design with bettered lighting performance. Others have engaged industrial or interior designers who have created lovely lighted forms. Many are far more satisfying to look at than to see by.

This glimpse of industry conditions does not mean to be discouraging. However, it makes amply clear the tremendous gap between the lighting profession and those allied groups who in general are closer to the consumer. Facing these conditions squarely has clarified the need for a strengthened foundation of residence lighting experience, study, measurement, definition. To mold it for clearer interpretation of fact and service responsibility and with keener insight into the overall concept of homemaking, as it is guided by other professions, is what the Residence Lighting Committee is undertaking and projecting.

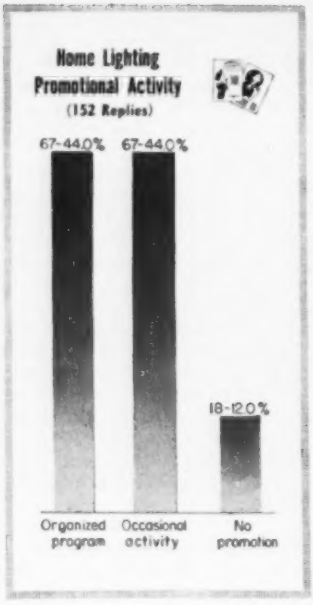
As a start on this charted course, fact-finding studies and analyses of nearly all the common visual problems of family life and of associated lighting equipments were made. They resulted finally in the first truly definitive report on the subject, "Functional Visual Activities in the Home." Another important report was published—"Contemporary Lighting in Modern and Traditional Interiors." It shows that the techniques of good lighting and good design are completely harmonious when the two are given equal professional attention. In preparation now is a new "Recommended Practice for Residence Lighting," which will include extensive design data as well as examples of specific lighting applications.

Mary E. Weber, Chairman,
IES Residence Lighting Committee

expense. A lower cost of 36¢ per dollar EAR is given by No. 106, Dayton Power & Light Co. Neighboring Cincinnati Gas & Electric Co, No. 123, reports a cost of 39.4¢ which is the direct cost of promotion of both home lighting and home wiring. It does not include the cost of advertising.

Cost of home lighting promotion was given in two more replies, from utilities that prefer not to be identified. One, No. 113, reported $4.31 EAR per expense dollar and the other, No. 79, 30¢. It seems likely that No. 79 replied to the question in reverse since the tabulation shows this utility rather above the average in promotional activity, which would not be justified by a return of only 30¢ per dollar of expense. Assuming that the 30¢ is the expense, the EAR becomes $3.33.

Promotion Pays Out . . . Putting all six replies on the same basis shows EAR's of $4.31, $3.33, $2.78, $2.54, $2, and $1.22. Whatever may be the differences in accounting of sales expense among these utilities, it certainly appears that home lighting is a profitable field for promotion and handsomely meets Henry L. Doherty's requirement of a dollar of revenue for a dollar of sales cost.



Another reply, No. 97, Utah Power & Light Co, gave no figure of EAR but said that approximately $15,000 would be expended in home lighting promotion in 1952. As the company has 151,019 residential customers, intended promotional expenditure is around 10¢ per customer.

In most of the survey returns the space for reply to this question of cost of home lighting promotion was simply left blank. In some, replies were "Don't know," "Not segregated," "No record," or the like. The general lack of knowledge of cost thus revealed indicates that most home lighting promotion is just shooting in the dark, neither expense nor results clearly seen.

FOR BETTER HOME LIGHTING—

Certified Lamp Makers Say All Elements of Lighting Industry Must Work Together

As compared with others in the field of current-consuming equipment, portable lamps are a "peanut" business. Some 500 manufacturers divide a volume of business that is variously estimated to total somewhere between $100 and $200 million annually. A few of these manufacturers occupy relatively dominant positions in their industry, but none even approaches the stature of a Philco, a Hotpoint, an Admiral, a General Electric or a Westinghouse.

Consequently, only a few lamp manufacturers do any national advertising, and of necessity it is product advertising. . . . It makes no attempt to educate the consumer, to expand the market. Thus to develop the market, to tell more people why they should use more and higher wattage lamps, requires two things: (1) cooperative effort on the part of the portable lamp manufacturers, and (2) collateral effort on the part of those others who stand to benefit from the increased sales and usage of portable lamps . . . the component manufacturers, the bulb manufacturers, and particularly, the entire electric utilities industry.

Cooperative effort within the industry means a contribution by individual manufacturers to a promotional fund to be applied to market development. Such contributions, based preferably on units sold, would not be a burden on any individual company but in the aggregate would provide means for an aggressive and continuing promotional program.

Collateral effort means the development of a product and a program that merits the support of those outside the lamp industry itself but who are commercially interested in its growth and development. Again, the principal source of collateral support is the electric utility, and to woo successfully this support it is obvious that a product must be provided which the utility can endorse and for which it can go "all out" promotionally.

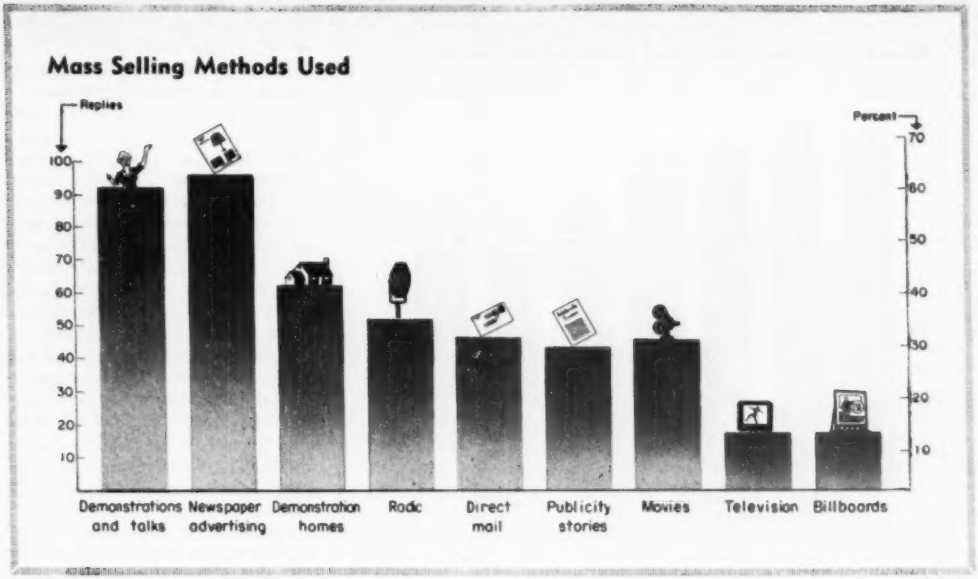
These were the concepts on which the IES Better Sight Lamp program were based: (1) a product that was sound in mechanical and electrical construction and in illuminating performance, and (2) a program for market development that would be supported cooperatively by the manufacturers and collaterally by the utilities. These concepts continue as the basis for the Certified Lamp program, and, so far, no one has questioned their inherent soundness.

In spite of this, the Certified Lamp program has not had the success so many expected of it and predicted for it. Retailers, in the huge majority, still refuse to believe that good lighting is a function of lamps and manufacturers' representatives, and commission salesmen shake off responsibility for changing this attitude on the part of their retail outlets. There are a few exceptions to this, enough to demonstrate that it can be done, but too few to overcome this inertia on the part of the retailer.

Rightly or not, the future of the Certified Lamp program rests in the hands of the utilities. If they are sufficiently interested in the development of residential lighting, if they feel the product is one that benefits their customers and that the program is one that deserves their support, success is assured. But if too few of them feel any responsibility for—or see any opportunities in—the CLM program, it can't go very far.

In that event, we can put portable lamps in the category of pure decoration, like wall paper and drapes, and forget them as a means for adequate lighting. The 40 and 60-w bulbs "decorators" use hardly spell "Better Light for Better Sight."

D. M. Julien,
Executive Secretary, CLM



Promotion Aimed at Mass Market

All techniques of mass market selling lend themselves readily to the promotion of home lighting. But newspaper advertising is the most used. Ninety-six or 63% of the 152 companies reporting used this medium.

The next most popular medium was demonstrations or talks to clubs and other groups. Ninety-two or 61% of the companies employed them. Apparently this means of promotion is slipping in popularity. Over a year ago the Residential Lighting Committee of Edison Electric Institute made a similar survey. Then 81% of the companies used this means.

Newly built homes used for demonstration of modern lighting to the public have been widely accepted as a means for effective promotion in recent years. Some 41% of the utilities covered are using this method, 62 of the 152 replies. Related to this are efforts to sell modern lighting ideas to people planning new homes, to architects, and to speculative builders. According to the tabulated results of the survey, 129 replies or 85%, say that advisory service on lighting is offered to people planning new homes. Continuous contact with architects and speculative builders is reported in 96 replies, 63%.

Hard to Classify . . . Replies to the two questions on advisory service and contacts with architects and builders were very difficult to classify for tabulation. It is probable that the proportions of 85% and 63% overstate considerably the activity in these directions. Quite a number of replies that had to be entered as affirmative in respect to advisory service were of the "Occasional" or the "If requested" kind. And it is suspected that many of the "Yes" replies are in the same category. If advisory service is given only in response to request, it can hardly be said to be offered.

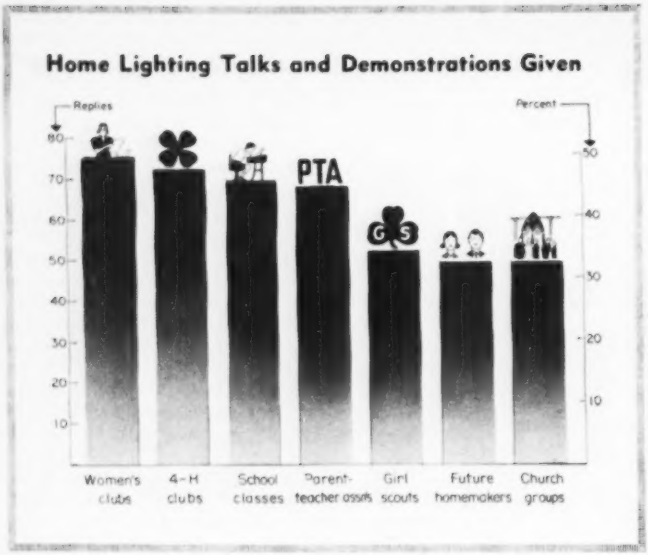
The same indefiniteness exists in respect to replies to the question on contact with architects and builders. "Should be doing more," "When called upon," and similar replies had to be put in the "yes" column even though they did not specify "continuous" contact.

It is impossible to estimate how much lighting figures in advisory service to home builders and in contacts with architects and speculative builders. It is inextricably mixed with consideration of adequate wiring and promotion of appliances. How much or how little attention is given to lighting depends on local factors. One must conclude that the companies whose replies are reported as "AB" in the column, "Lighting for New Homes," are not doing much in that way of promotion if they have only a few letters in the columns under "Mass Market Approach."

Radio and Television . . . About one third—53, 35%—of the replies report use of radio for promotion of home lighting, and 21—13%—report use of television. Here again it is impossible to know how strongly lighting is featured because these two advertising media are used also for simultaneous promotion of other services.

Use of direct mail is stated in 46 replies, 30%; publicity stories in 43, 28%; movies in 48, 32%; billboards in 20, 12.5%. The survey question did not ask how often these media were used in home lighting, and the replies therefore do not indicate how extensively they are employed. But they do say that at least some utilities are not overlooking these means of carrying the story of modern home lighting to the public.

Next to newspaper advertising, talks and demonstrations to clubs and other groups have already been noted in



this discussion as most widely used as a promotional method. Detail on this point is furnished by replies to a survey question on instruction in home lighting. Women's clubs apparently get most attention in this aspect of promotion. About half, 75, of the replies mention them. Other adult groups are Parent-Teacher Associations, noted in 68 replies, 45%; and church groups, noted in 49, 32%.

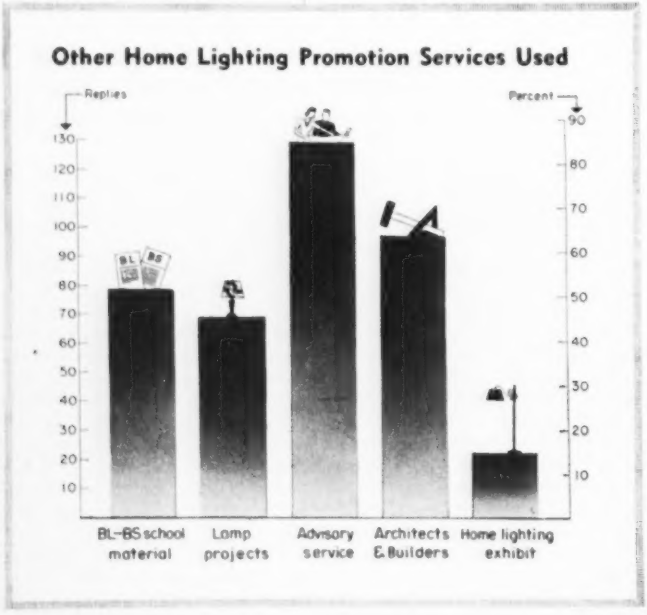
Youth Programs Popular . . . Young people are widely appreciated as fertile ground in which to plant knowledge of proper lighting. Information and instruction to school classes are reported in 69 replies, 45%; to 4-H Clubs in 73, 48%; to Girl Scouts in 52, 34%; and to Future Home Makers in 49, 32%.

In connection with work with school classes, the reader's attention is directed to one of the boxed statements, that appears on the next page, from the Better Light Better Sight Bureau. Available from the Bureau is material for instruction in light and vision set up in courses arranged for school grades. To a question on fostering such instruction in schools by use of this material 78 replies, 51%, reported in the affirmative.

An effective way of bringing appreciation of proper home lighting to young people is by the organization of lamp-making and lamp-conversion projects. Work of this kind is done largely with 4-H Clubs, Future Home Makers and Girl Scouts. Of the 152 replies, 68, 45%, report such work.

But for youth groups the story of such projects is very different. Many thousands of kits for assembly of complete lamps have been supplied at cost or less to 4-H Club camps by companies of the American Gas & Electric system. The Central Hudson Gas & Electric Corp aims at high school students, distributes lamp wiring kits—socket, cord, harp and lamp—to woodworking and industrial arts classes and offers prizes for the best lamps produced.

Availability of the R-40 lamp and of kits designed to go with it have made conversion of old floor and table lamps to modern standards very easy. They are widely used in working with youth groups, also as campaign merchandise in door-to-door selling.



Showing Home Lighting . . . To a question on permanent exhibits or rooms for demonstration of modern home lighting there were 22 affirmative replies, 14.5%. Many of these were qualified.

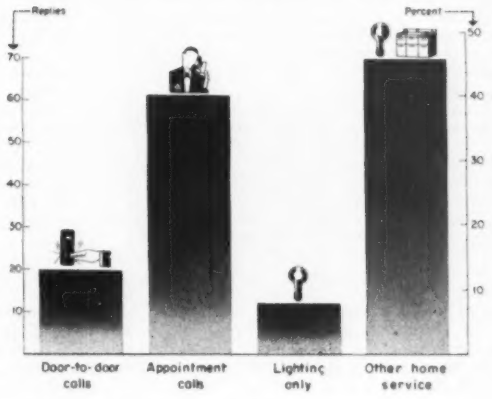
One company replying "no" to this question reports the use of eight large portable displays provided by manufacturers and distributors. They are circulated in the company's district offices. This company has plus 290,000 residential customers. Kansas Gas & Electric Co, with plus 89,000 customers, has one permanent demonstration room and seven portable displays. Detroit Edison Co has installed demonstration booths in its district offices.

Lighting Is a Part of Home Service

Lighting promotion is an undetermined part of the work of home service personnel. Only 82 companies, 54%, reported such activity. Of these 70 or 46% of the total 152 companies replying said lighting was included with other home service work. Twelve or 7.9% had workers devoting their time to lighting promotion or service.

While 82 replies reported activities of home service personnel, fewer told how many. For 1951, 57 replies reported a total of 684 such employees and for 1952, 58 reported 670, a decline of 14 from the previous year. There is evidence from the replies of a wide variation of opinion as to the need and usefulness of home lighting advisers, in fact of any home service personnel at all. It must be concluded from inspection of the tabulated data that some utilities do not do any home service work, much less lighting promotion by personal contact, although this was not covered in the survey.

Home Lighting Advisers Aid in These Ways



FOR BETTER HOME LIGHTING—

Better Light Better Sight Bureau Provides Material for Education in Light and Vision

To an organization such as the Better Light Better Sight Bureau, organized to make available to the electrical industry tools for education of customers on light and sight, home lighting is, of course, a most important field of activity.

The sheer size of the home lighting market, its universal appeal to all types of customers, and the fact that home lighting progress has lagged behind that achieved in commercial and industrial markets are more than sufficient to justify the interest of our industry in improving home lighting practice on a wide scale.

To show homemakers the how and why of good lighting and to offset the continued promotion of lamps and fixtures on a basis of style and decoration without regard to their lighting value is a task of education rather than of sales promotion. And to assist the industry in this work, the Bureau's Home Lighting Education Committee, headed by H. A. Stroud, Monongahela Power Co, has consistently met the industry's need for suitable educational materials.

The present trend among home lighting specialists in planning for better seeing conditions follows the principle of "Light the task, rather than the room." In accordance with this trend, current bureau booklets and folders on home lighting discuss the lighting needs of individual tasks, such as reading, sewing, home study, kitchen work, and the like. Thus, they are of maximum help to the home lighting specialist in showing the homemaker why good light is necessary and how it will help in her work.

Other products of the bureau's committee—films, booklets, slide-lecture demonstrations—offer utility home lighting specialists effective tools for use in personal calls and at group meetings.

Another, and a most important part of this committee's work, is the preparation of tools for education of our industry's future customers—the children now attending elementary and junior high schools.

Two teaching programs, designed for light-sight instruction at these grade levels, are now in use in the territories of many electric companies. In hundreds of schools throughout the country this instruction is a regular part of the teaching schedules.

A third teaching program, for use in home economics classes of high schools, is now in the early stages of preparation. Its influence upon future home lighting standards is expected to be marked.

Active effort in the home lighting field offers rich and lasting rewards to this industry. We believe that user education is the first, and basic step, in such effort. And, whatever the means of education selected by the electric utility—personal calls, group meetings, demonstrations, exhibits, model homes, or others—bureau materials are ready to assist the home lighting representative.

S. L. Drumm, Chairman
Better Light Better Sight Bureau

FOR BETTER HOME LIGHTING—

Lamp and Shade Institute of America Advocates Integration of Light and Decoration

To the homemaker, the term "good lighting," comes to life only when it is translated into attractively styled lighting units. The Lamp and Shade Institute of America believes that any campaign to improve standards of illumination in the home must therefore be keyed to the current, widespread interest in interior decoration.

The institute recognizes the fact that home furnishings have become a fashion industry. The consumer press is devoting more and more space to developments in architecture and interior design, emphasizing the important contribution of home planning to the "art of living." As a result, the general public is highly informed in what was formerly the specialized field of the professional decorator. Every item going into a home is measured in relationship to colors, lines, and materials of other furnishings.

How does good lighting enter the home fashions picture?

At the recent home furnishings markets in New York and Chicago, there was ample evidence that manufacturers of portable lamps are not only aware of the problem but have taken forceful steps towards solving it. They introduced thousands of new designs which combine proper lighting with styling specifically planned to enhance today's decorating schemes.

As the voice of 300 manufacturers across the country, the Lamp and Shade Institute is keeping the public informed of these achievements in a nation-wide consumer education program, stressing the dual theme of good lighting and tasteful decoration.

This theme is explored from a number of different angles.

To focus attention on home lighting, the institute issues periodic news reports to newspapers and magazines, outlining latest trends in lamp design, explaining their application in the home, and comparing them to similar developments in other furnishings.

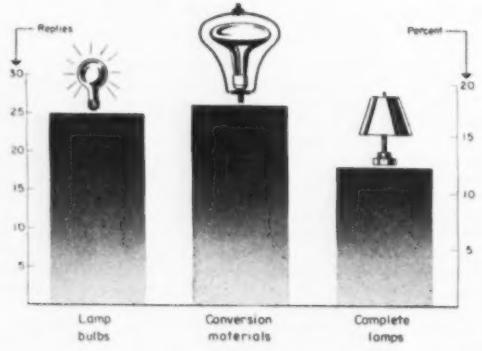
To help consumers obtain maximum efficiency from their lamps, the Institute is demonstrating proper placement of light sources in illustrated feature articles. A typical example includes a set of "right" and "wrong" photographs of the same room, contrasting effective lighting with poor illumination, balanced arrangement with badly proportioned groupings.

A new project, scheduled for the fall and winter, will show householders how to light their homes, room by room. This publicity series will trace the correct use of lamps from the foyer through the nursery, den, dining, and living room to the bedroom.

All educational material prepared by the Institute is accompanied by photographs taken in appropriate home settings. Detailed information is given on how, where, and with what type of furniture different lamps should be grouped for utilitarian purposes and decorative appeal. In this way, the institute is proving that lamps can—and do—lead a double life.

Doris Herzig,
Public Relations Director, LSIA

Home Lighting Advisers Sell



Ideas Differ Greatly . . . However, in the replies reporting numbers of home service people, the variation of opinion is plain. At one end of the scale is a utility that has plus 10,000 customers and five home service people. At the other end is one with plus 356,000 customers and two advisers.

Only 21 replies, 13.8%, reported advisers making door-to-door calls. Calls by appointment were reported by 61, 40%. Only three replies indicate that door-to-door calls are the only method of individual contact used in home lighting promotion. In these three cases the advisers were temporary employees hired for a campaign. Both door-to-door and appointment calls were reported in 17 replies, 12%. Illustrative is the reply from the Union Electric Co of Missouri:

"We have 28 residential service saleswomen who made 31,992 customer calls in 1951. These women endeavor to interest the customer in improved lighting in kitchen and living room on each call."

Of the 88 replies reporting some kind of individual contact method in lighting promotion, only 28 said that merchandise was sold by advisers. In 14 cases, lamp bulbs, conversion materials, and complete lamps are sold; in ten, bulbs and conversion materials; in two, conversion materials and complete lamps; in one, bulbs and complete lamps; and in one, complete lamps only. Putting the data another way, 25 replies reported sale of lamp bulbs; 26, sale of conversion materials; and 18 sale of complete lamps.

The replies do not furnish a clear picture of home contacts in the promotion of lighting. Not only is promotion mixed up with general home service, but in some cases of door-to-door calls it is simply straight selling.

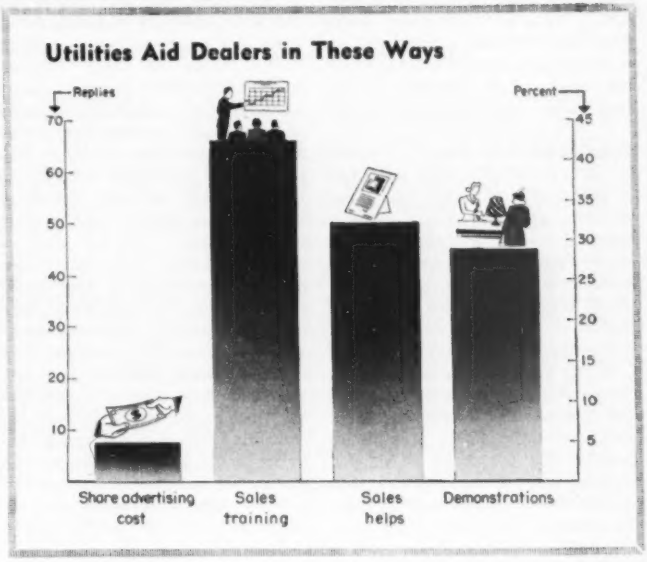
Dealer Cooperation Can Be Improved

Utilities and electrical dealers are not working together as much as they should on home lighting promotion. This is evident from the fact that only 73 companies or 48% replied that they were cooperating in any way with dealers.

Judging from the statements presented elsewhere of the National Retail Furniture Dealers Association and the Lamp and Shade Institute of America, this is an unfortunate trend.

The reason may be that utilities have concluded that they must go it pretty much alone in the home lighting business. Another could be the difficulty of evaluating the results of such cooperation. Some time ago, when an EEI committee surveyed the industry on cooperation with dealers in promoting CLM lamps, 57% of the companies replied in the affirmative. But it was easy for them to check the results in terms of sales.

The EW survey question on this



FOR BETTER HOME LIGHTING—

Edison Electric Institute Collects Promotional Ideas and Disseminates Them Widely

Home lighting, the oldest market for electricity, enjoys the highest degree of saturation of all of the electric industry's services. Yet this market offers great potential opportunities for present-day load building.

Recognizing the importance of these facts to our industry, the Commercial Division of Edison Electric Institute includes an active Residential Lighting Committee consisting of representatives of electric light and power companies who have been selected to combine the viewpoints of large and small companies in many parts of the country.

Throughout good times and bad residential lighting has proved the most stable of all markets for kilowatthour sales. In spite of the many years of continued progress and splendid achievement in illumination techniques, there are still very few homes today that have attained what might be called the final word in residential lighting. With research and design improvement constantly bringing new ideas and new equipment with which to do a better residential lighting job, there is a never-ending progress which keeps the degree of obsolescence of present equipment at a high level.

The members of the Residential Lighting Committee over the past five years have produced dozens of pieces of informational and promotional material as a part of the Residential Planned Lighting Program. Many thousands of booklets, mailers, visualizers and folders, the results of this committee's work, have been made available to the public through electric utilities.

Currently, the committee has been revising and bringing up to date one of its most widely used booklets, "Planning Your Home in the Right Light." The revised edition will be issued during the late summer for use in the fall. The new booklet, "Your Home Lighting Idea Book—for Beauty—for Easy Seeing," will discuss the functions of home lighting from cellar to garret, pointing out the many advantages of planning home lighting for maximum help with everyday household tasks. In simple terms it gives the home owner or prospective buyer a sound, practical introduction to the importance of good residential lighting.

During the past year, the Residential Lighting Committee also has been active in the preparation of a report, shortly to be released, entitled, "The Home Lighting Story of Company X." This report was prompted by the desire of the committee to emphasize to electric service companies the potential profit to be attained through extensive promotion of home lighting. Material for this report was obtained from successful experiences of many electric companies and prepared so as to present a composite picture of how a typical company can promote home lighting using the practices and plans that have been developed by many companies.

In these times of increased use of electricity in the home, the Residential Lighting Committee finds it imperative to keep its plans for assisting the industry to improve home lighting standards constantly before the commercial and executive management of the electric utility companies in order that management will not lose sight of the many basic and fundamental advantages of the home lighting load.

J. R. Hartman, Chairman
Commercial Division General Committee, EEI

point of dealer cooperation was in four parts. The first asked if utilities shared costs of advertising merchandise offered by lamp and fixture dealers. This is not a general practice. There were seven affirmative replies, 4.6%. A much more common practice is for the utility to urge customers to "see your dealer" in its home lighting ads.

Teaching Them to Sell . . . Training of dealer personnel in sales techniques is the means of cooperation most generally offered to dealers. This is indicated by 65 "yes" replies, 43%, on this point. How many of these replies refer specifically to training in selling home lighting and how many include it in general sales training, it is impossible to know.

To the third question on providing merchandising helps and demonstration equipment for dealers there were 49 "yes" replies, 32%. It must be assumed that practically all of this material supplied to dealers is that available from manufacturers of lighting equipment and lamps, and from the Edison Electric Institute and the Better Light Better Sight Bureau. Respondents in the survey were asked to send along with their replies any pertinent exhibits of promotional material, but not—and this was underlined—samples of pieces available from manufacturers or other industry sources. In the considerable quantity of such material received there are no exhibits of sales helps offered to dealers. So from this it must be concluded that practically all such material is obtained from industry sources, is not locally produced.

Demonstrations of modern home lighting in dealer stores were stated in 44 replies, 29%. Probably most of these referred to demonstrations of specific merchandise, such as CLM lamps. However, there are other factors in the home lighting picture that lend themselves readily to such exploitation. Packaged conversion materials for modernizing old lamps are a "natural" for store demonstrations.

Home lighting demonstrations on dealer premises are of two kinds. One is concerned with specific merchandise, showing and explaining the features of that merchandise to any and all who will stop to listen and look. The other is a more elaborate presentation which is advertised for a definite time and place and covers pretty well all phases of home lighting, its why's and how's. The survey question made no distinction between the two kinds of demonstrations.

It is interesting to note in the tabulated data that of the 44 replies reporting store demonstrations, 39 also report training of dealer sales personnel. This suggests that for most utilities, demonstrations serve the double purpose of informing customers and at the same time of giving dealer people more instruction on how to sell.

As previously intimated, these responses on the point of cooperation with dealers do not present a clearly defined picture. Their value is in giving an impression. It is that much more could be done towards enlisting the interest of dealers in the promotion of modern home lighting.

More Utilities Staging Bulb Campaigns

Of all their home lighting promotional activities utility companies seem to have the best knowledge of the results of their bulb sales campaigns. The reason is simple. A bulb campaign is a short-time activity. Its results are readily measured.

Campaigns last year were reported by 46 replies, 30%. Campaigns this year, held in the spring or planned for the fall, were reported by 56 replies, 37%. Of those that had campaigns last year, nine are having none this year. But this loss is offset by 19 replies stating campaigns this year.

Indicative of the results to be obtained from bulb campaigns are the figures supplied in the reply from a utility with plus 215,000 residential customers. In this campaign, running from Oct. 1 to Nov. 10, 54,665 kits of lamps were sold, one to about every fourth customer. Income from these sales was $42,060.62. Cost of the campaign—everything included—was $67,188.17. The net cost to the utility was thus $25,127.55. Against this is set an estimated increase in revenue of $1 per kit sold, $54,665. This campaign added a dollar of revenue at a cost of 46¢.

Two Kinds of Campaigns . . . Bulb campaigns are indicated by the exhibits received in the survey to be of two kinds. In one sales are made through established retail outlets, dealers, company stores, or both. In the other bulbs are sold by utility employees only.

Representative of the first kind are methods used by New Orleans Public Service, Inc, Central Power & Light Co, and Louisiana Power & Light Co. Point-of-sale material is furnished to dealers—door and window streamers, counter cards, etc. Bill enclosures, newspaper advertisements, and other means are used to distribute purchase coupons to customers. Buying lamps from a dealer, the customer fills out the coupon and receives a free lamp, usually 150-w. The dealer is then reimbursed at retail price by the utility when he sends in the coupon.

Additional to the profit enjoyed by the dealer from increased sales resulting from the free bulb offer and the utility's campaign advertising, he may also win a money prize. As part of its bulb campaign, New Orleans Public Service stages a window display contest among dealers. Displays must feature the 150-w bulb given free with each package purchase and make use of point-of-sale material furnished by the company. Prizes running from $15 to $50 are awarded to stores and also to individuals who designed and dressed the winning windows.

Package may be fixed—two each of 40, 60, and 100-w bulbs, plus the free 150-w. Or it may be variable, containing six purchased bulbs totalling not less than a minimum wattage.

Sells Bulbs in Supermarkets . . . An interesting variation on the dealer participation idea is employed by the Louisiana Power & Light Co. District managers arrange special promotions of one or two days duration with selected grocery stores, supermarkets, or others with heavy customer traffic that sell lamp bulbs. A utility sales person is stationed at a strategically placed booth in which the dealer has placed an ample stock of bulbs. Effort is made to sell six or more 75-w or larger lamps in one purchase, with a bonus of one 150-watt lamp for which the dealer is paid by the utility.

Typical of bulb campaigns by utility employees are those of the Central

FOR BETTER HOME LIGHTING—

National Retail Furniture Association Cooperates Wholeheartedly with the Electrical Industry

Home lighting and home furnishings quite naturally go hand in hand. Only through proper illumination can the beauty of fine wood finishes and fabrics be properly shown in the home. This aspect of home lighting, of course, is in addition to its most important function of permitting the performance of the various home tasks under the most pleasant and healthful conditions.

The National Retail Furniture Association has been cognizant of this problem for some years and has been doing something about it. Five years ago when the association began production of its sales training film series, designed to train the retail furniture salesman how better to serve the American homemaker, there were numerous instances in which home lighting was specifically treated.

In the original series of 15 full color, sound-slide films, proper home illumination was stressed in two of them, "Furniture Arrangement" and "Room Balance." It was specifically shown how the proper types of lamps from the standpoint of height and shade material were necessary to provide a truly comfortable room. Today, more than 1,700 stores in 749 cities are using these sales training films in presenting courses for their salesmen, both old and new.

In 1950, NRFA took the second big step in helping retailers and their salesmen sell more home goods by producing a series of seven full color, sound-slide films, "Furniture Films for Homemakers." These were designed for presentation to both present and future homemakers—and here again the subject of proper lighting played a major part in the presentations. These Homemaker films are now used nation-wide by 528 stores in 365 cities and are being shown before women's clubs, high school, college and state extension classes, parent-teacher associations, farm and church groups, and numerous other assemblages. Audiences these films have reached total several million.

The climax of the NRFA's effort to encourage proper home lighting came when the General Electric Co, Lamp Division, sponsored a full color, sound-slide film, "New Light On Your Favorite Subject," which is now being distributed to all the stores using either the sales training or the homemaker films.

The acceptance of this film by both the home furnishings industry and the consumer is indeed indicative of the intense interest which has been generated in this subject from the efforts of both the electrical and the home furnishings industries.

It is quite apparent that the interest of the home goods stores in proper home lighting is far more than academic, and that any assistance from or to them in the furtherance of this most worthy objective will be readily given or received.

Carl J. Dueser, Manager
Merchandising Division, NRFA

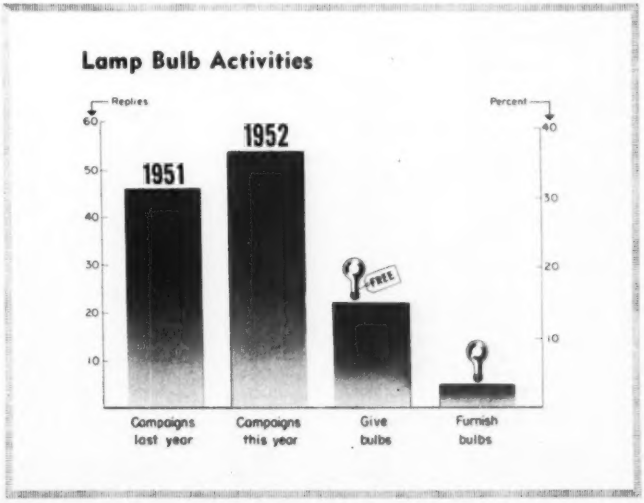
Louisiana Electric Co and the Electric Power Board of Chattanooga. In the Cleco campaign the package of lamps was not fixed but could be six of any size plus one 100-w free. Commission of 10% was paid on bulbs sold at list price and 5% on quantity discount sales.

Solves Delivery Problem . . . The Chattanooga campaign is an established semi-annual affair, spring and fall. In the spring campaign this year, the package offered contained six lamps, one 150-w, two 100-w, and three 75-w, no free lamp.

Prizes totalling $115 and ranging from $10 to $25 were awarded to employees with highest sales.

The quota for this campaign was set at 8,000 packages. Total sales were 13,010 packages, 162% of quota. This means that an average of 575-w was placed in about one out of six homes served by the utility. Considering that the campaign is staged regularly twice a year, this is a remarkable accomplishment.

Free Bulbs Once a Year . . . One question not covered in the tabulation of replies asked if free bulbs were given to all customers once a year as a stimulus to use of higher wattage lamps. Most of the "yes" replies referred to "bonus" bulbs given with purchases in campaigns, thus were not responsive to the question. There were only two unequivocal replies to this question. One was from the Monongahela Power Co stating that in each year, 1951, 1952, 150,000 150-w bulbs were distributed door-to-door, and in 1948, 1949, 1950 the same procedure put the same number of 100-w bulbs in the homes of customers. The other reply stated a 150-w bulb is given all customers once a year.



Home Lighting Promotion Methods of 177 Electric Utilities Serving Nearly

No.	1951 Average Residential Customers	1951 Average Kwhr per Res. Cust.	Kwhr Used for Lighting by Aver. Res. Cust. (1)	Mass Market Approach		Individual Contact Approach Lighting Advisers (4)		
				General Publicity (2)	Instruction in Home Lighting (3)	1951	1952	Method of Contact
1	6,632	2441	900 E	.....	.....	....	....	.....
2	6,968	2693	600 G	.....	.....	....	....	.....
3	7,196	1286	386 E	AH	CH	....	....	.....
4	9,428	1983	1140 G	.....	.....	....	....	.....
5	9,503	1334	380 G	ABDF	.....	....	....	.....
6	10,310	1840	744 E	ABCDHK	.....	....	5	ADEG
7	11,557	2590	.....	.....	.....	....	....	.....
8	12,300	1620	720 E	.....	.....	....	....	.....
9	12,937	1955	.....	.....	.....	....	....	.....
10	13,571	1503	480 G	ABCGH	ABCDEFGH	2	2	CEF
11	15,627	2114	300 G	ADF	J	....	....	D
12	16,277	1647	420 E	.....	.....	....	....	EFG
13	17,865	1247	.....	ADH	CDHJ	....	....	.....
14	19,746	2316	360 G	.....	CH	....	....	.....
15	22,572	2383	400 G	ACGHJ	ADEFGJ	3	3	ABDEFG
16	27,000	2400	500 G	AG	HJ	....	....	BDEFG
17	28,000	1636	725 G	ABCDHJ	BCDEFGHJ	6	6	ADEFG
18	30,809	2156	646 G	ABCGHJ	BDEFGHJ	....	....	.....
19	31,318	1197	480 G	B	.....	1	1	BD
20	31,425	1734	720 G	ABCDGH	CDEFHJ	....	....	D
21	31,534	2897	.....	ACGH	ABDEFGH	1	1	BC
22	33,033	1907	420 E	A	.....	....	....	.....
23	34,275	2100	480 E	AGHJ	CEFH	....	....	D
24	35,817	1778	480 G	ADJ	BDE	2	2	BD
25	37,450	1520	170 G	ACGK	D	....	....	.....
26	38,408	2308	490 G	G	.....	....	....	.....
27	40,000	1850	.....	.....	.....	....	....	.....
28	41,675	1350	.....	ABCDFGHJ	BCEH	2	2	BD
29	43,858	1831	420 G	ACH	ABCDEFGHJ	3	4	BD
30	45,639	6451	.....	.....	.....	....	....	.....
31	45,935	1781	600 G	ADH	ADEGJ	1	1	BD
32	46,449	1744	.....	H	CHJ	....	....	.....
33	46,559	2089	.....	ACGH	DEFHJ	....	....	.....
34	47,531	2026	.....	ACD	.....	....	....	.....
35	47,913	2375	540 G	H	CDJ	....	....	.....
36	48,032	2213	600 E	CDGH	DEJ	7	7	BDEFG
37	48,409	1384	360 G	AD	CDFJ	....	....	.....
38	48,475	1394	.....	AD	CDF	....	....	.....
39	48,919	1598	792 E	ABC	ABEFG	....	....	D
40	50,583	1345	780 G	AG	.....	....	....	.....
41	50,708	2095	600 G	H	ACJ	....	....	.....
42	51,639	1913	480 G	ADH	CDH	....	....	.....
43	52,342	1526	240 G	.....	.....	....	....	.....
44	55,527	5564	.....	ABCDGH	H	....	....	BD
45	55,745	1176	420 G	A	.....	....	....	.....
46	56,844	1788	900 G	ABCGHJK	ABDEFGJ	4	3	ABDEF
47	57,204	2047	.....	E	J	1	1	BD
48	57,903	1308	.....	AH	H	3	3	BC
49	57,908	5790	.....	A	DJ	....	....	BD
50	60,057	6345	700 G	ABCDFGHJK	BCDEFHJ	....	....	BD
51	61,000	1148	300 G	AH	ABCDEFGJ	....	....	DEFG
52	62,245	2438	540 G	A	J	....	....	.....
53	63,494	2160	.....	A	.....	....	....	.....
54	63,686	2652	1100 E	ABGH	BCF	....	....	D
55	66,123	1648	.....	ACD	CHJ	....	....	.....
56	68,308	1997	350 G	ACGHJ	CDEGJ	....	....	.....
57	69,130	4620	420 G	ADH	DEFJ	....	....	.....
58	72,136	2248	400 G	GH	EFG	....	....	BD
59	77,782	2252	676 G	BCDEGHJ	ABCDEFGJ	1	1	BC
60	77,914	2288	595 G	HJ	DFHJ	....	....	D
61	78,905	2325	.....	BDFGH	C	....	....	.....
62	79,415	2056	540 G	.....	.....	....	....	.....
63	79,800	1630	400 G	ABHK	DEF	12	12	ABCEFG
64	81,407	2248	480 G	GH	AF	....	....	D
65	83,696	1721	.....	ABDGHJ	CEFJ	3	3	BC
66	84,058	5800	950 G	GHJ	ACDEFHJ	23	23	ABDEFG
67	86,287	3950	550 G	AD	.....	....	....	.....
68	88,635	2044	500 G	B	H	....	....	.....
69	89,722	1634	450 G	ABCDHJK	ABCDEFGHJ	27	27	BDEFG
70	90,785	1880	470 E	AHJ	ABCDEFGHJ	....	....	DEF
71	101,444	1769	540 G	BGH	CDEFGJ	....	....	.....
72	101,686	1464	900 G	ADH	ABCDEFGHJ	....	....	.....
73	106,472	1907	700 G	GH	.....	2	2	BDEF
74	106,784	2078	360 E	DGHJ	ABCDHJ	14	14	BD
75	106,939	1973	300 G	.....	.....	....	....	.....
76	108,718	2264	400 G	ACGHJ	ADEFGJ	18	18	ABD

30 Million Residential Customers Are Summarized in These 152 Replies

Lighting for New Homes (5)	Cooperation with Dealers (6)	Lamp Bulb Campaign (7)	Promotional Activity (8)	No.
.....	.....	.....	N	1
AB	.....	.....	O	2
A	BC	.....	O	3
A	.....	AB	N	4
AB	B	B	P	5
AB	B	.....	O	6
AB	.....	AB	N	7
.....	.....	.....	N	8
.....	.....	.....	N	9
AB	BCD	AB	P	10
AB	.....	.....	P	11
A	.....	.....	N	12
AB	.....	.....	N	13
A	.....	.....	N	14
AB	BCD	.....	O	15
A	.....	B	O	16
AB	.....	AB	O	17
AB	ABCD	B	P	18
AB	.....	B	O	19
AB	ABCD	B	P	20
A	.....	B	O	21
A	.....	.....	N	22
.....	.....	.....	O	23
A	.....	.....	O	24
AB	CD	AB	O	25
AB	.....	B	O	26
.....	.....	.....	N	27
AB	BCD	.....	P	28
AB	.....	.....	O	29
.....	.....	.....	N	30
A	.....	A	O	31
A	.....	AB	O	32
AB	BCD	AB	P	33
AB	.....	AB	O	34
A	.....	.....	O	35
AB	BCD	.....	P	36
A	.....	B	O	37
A	.....	.....	O	38
AB	.....	.....	O	39
A	.....	.....	O	40
A	.....	.....	O	41
.....	BCD	.....	O	42
.....	.....	.....	N	43
AB	ACD	.....	O	44
.....	.....	AB	O	45
AB	BCD	.....	P	46
AB	BC	AB	P	47
AB	.....	AB	O	48
AB	B	.....	O	49
AB	BCD	AB	P	50
A	BCD	AB	P	51
A	.....	.....	O	52
.....	.....	A	O	53
AB	D	.....	P	54
AB	BC	AB	P	55
AB	BC	AB	P	56
AB	BD	AB	P	57
B	.....	.....	O	58
AB	BCD	AB	P	59
AB	.....	.....	O	60
A	.....	AB	O	61
.....	.....	.....	N	62
AB	.....	AB	O	63
AB	BD	.....	O	64
AB	BC	.....	O	65
AB	BD	.....	P	66
.....	.....	.....	O	67
AB	.....	.....	O	68
AB	BC	.....	P	69
.....	B	.....	P	70
AB	BC	.....	O	71
AB	.....	B	O	72
A	.....	.....	O	73
AB	BD	B	P	74
AB	.....	AB	O	75
AB	BCD	.....	O	76

How Utilities Promote Home Lighting

Key to Symbol Letters

(1) E—Definite Estimate
G—Just a Guess

(2) A—Newspaper Advertising
B—Direct Mail
C—Publicity Stories
D—Radio
E—Television
F—Billboards
G—Demonstration Homes
J—Movies
H—Demonstrations and Talks
K—Home Lighting Exhibit

(3) A—Girl Scouts
B—Future Home Makers of America
C—4-H Clubs
D—School Classes
E—Women's Clubs
F—Parent-Teacher Associations
G—Church Groups
H—Lamp Making Projects
J—BL-BS Material in Schools

(4) A—Door-to-Door Calls
B—Appointment Calls
C—Work on Lighting Only
D—Lighting Included in General Home Service
E—Sell Lamp Bulbs
F—Sell Lamp Conversion Materials
G—Sell Complete Lamps

(5) A—Advisory Service to Home Builders
B—Continuous Contact with Architects and Speculative Builders

(6) A—Share Cost of Advertising
B—Sales Training for Dealer Personnel
C—Supply Sales Helps
D—Demonstrations in Dealer Stores

(7) A—Campaign in 1951
B—Campaign in 1952, already or planned

(8) P—Continuing Program
O—Occasional Activity
N—No Activity

Record of Replies Continued on Next 2 Pages

Home Lighting Promotion Methods of 177 Electric Companies . . . Continued

No.	1951 Average Residential Customers	1951 Average Kwhr per Res. Cust.	Kwhr Used for Lighting by Aver. Res. Cust. (1)	Mass Market Approach		Individual Contact Approach Lighting Advisers (4)		
				General Publicity (2)	Instruction in Home Lighting (3)	1951	1952	Method of Contact
77	109,773	1355	300 G	ADGH	ABDEFHJ	....	....	D
78	112,102	1464	216 G	....	....	....	....	....
79	112,159	1535	500 G	ADG	ABCDEFGHJ	....	....	....
80	117,368	2101	....	ABHJ	ABCDEFJ	14	14	BD
81	120,590	1410	600 E	DGHJ	BCDEFHJ	7	7	ABDEF
82	122,669	5073	780 G	....	....	....	....	....
83	124,595	1449	500 G	AHJ	BCDEFGH	....	....	....
84	127,500	2160	460 E	AH	ACE	....	....	....
85	129,151	1688	300 E	ABCDEFGHJK	ABEFG	....	....	ABDEF
86	129,881	1244	500 E	ABCHJ	ABCDEFGHJ	20	20	D
87	135,710	1411	360 G	ACDHJ	ABCDEFGHJ	10	12	BD
88	137,043	1277	425 G	....	CFJ	....	....	....
89	140,594	2365	....	CDEFGHJK	ABCDEFGJ	6	6	ABC
90	144,686	1828	731 E	A	J	2	2	BD
91	145,387	4722	....	....	....	....	....	....
92	147,612	1847	900 E	ABCDEGHK	ACDEHJ	1	1.5	BC
93	148,374	1964	540 E	....	J	....	....	....
94	149,293	....	....	....	....	....	....	....
95	149,942	2033	360 G	ABDEFH	AEFG	9	9	BD
96	150,830	2267	480 E	ADEGHK	ACDEFGHJ	12	10	ABD
97	151,019	2935	735 E	....	ABCDEFGHJ	10	10	D
98	152,175	1751	700 G	ABDEHJ	BCDJ	....	....	....
99	154,598	1322	675 E	ABFGH	ABCDEFGH	....	....	D
100	155,702	1894	600 G	AEK	ABCDEGJ	....	....	....
101	157,686	1584	840 G	ACDGHJ	CEFG	24	20	ABDG
102	157,812	2005	600 G	ABDEFHK	CEFGH	....	....	....
103	163,384	1607	450 G	....	....	4	4	BD
104	165,495	1333	467 E	ABCDGHJ	ABCDEFGHJ	....	....	B
105	166,900	1705	420 G	H	CEHJ	....	....	D
106	175,397	2084	625 E	ABCEFGH	ABCDEFGHJ	4	4	ABDFG
107	141,000	5766	720 E	....	....	....	....	....
108	177,681	1670	480 E	ADFGHJ	HJ	....	....	D
109	180,507	1690	580 E	A	J	....	....	....
110	182,968	1713	....	ABJ	AEHJ	3	2	BD
111	183,128	2281	500 G	J	H	....	....	....
112	184,227	5543	660 E	....	....	....	....	....
113	196,254	1265	....	HJ	ABCEH	65	45	ACEF
114	205,100	1233	500 G	AEHJ	CDEHJ	....	....	D
115	215,249	2226	475 G	AB	CHJ	....	....	....
116	222,060	1800	600 G	ACDGHJ	ABCDEFGHJ	....	....	D
117	222,435	1885	....	AG	....	....	....	....
118	227,188	2463	240 G	CH	ABCDEFGHJ	16	45	BDEFG
119	231,109	1830	732 G	ABCDEFGHJ	ABCDEFGHJ	7	6	BD
120	241,793	2158	660 E	ABDHK	ABCD	1.5	1.5	BC
121	272,336	1850	1110 G	ABGHJ	ABCDEFH	4	4	BD
122	280,858	2211	700 E	ABCFGHJ	ABCDEFGHJ	22	22	BD
123	289,811	1846	750 E	ABCDEFGHJK	ABCDEFGHJ	8	11	ABDEFG
124	292,594	2445	400 G	ACDGHK	ABCDEFGHJ	10	17	BDEFG
125	305,797	1812	500 E	ABCDGHJ	ABCDEFGHJ	6	7	ABCEFG
126	319,457	2385	500 G	ABCDEGHJ	CDHJ	2	2	ABD
127	326,446	2141	700 E	ACDEGHJ	ACDEFGH	10	10	BD
128	356,114	1618	540 G	BHK	DEFG	2	2	BC
129	368,447	1784	....	A	....	....	....	....
130	379,486	1773	420 G	ACDGHJ	BCDEFHJ	....	....	BD
131	380,513	1485	456 G	BDEH	C	....	....	....
132	380,965	2129	750 E	ABCDEGHJ	DEFGHJ	....	....	BCEF
133	400,946	2671	420 E	HJ	ABCDEF	44	44	ABDEFG
134	402,564	2489	600 G	ACGH	H	....	....	....
135	425,370	2909	400 G	ADGH	ABCDEFHJ	....	....	....
136	434,799	2054	500 G	ABCDFGHK	ABCDEFGHJ	28	28	ABD
137	443,791	2298	900 G	AEGHJK	DEFGJ	1	....	C
138	453,620	1796	360 G	ACGHJ	DHJ	35	38	BD
139	457,270	2215	480 G	H	ABCDEHJ	15	15	BD
140	507,842	2117	635 G	AHK	CH	10	8	BDEF
141	587,428	1651	900 G	H	....	....	....	....
142	600,900	2492	500 G	GHJ	....	22	23	BD
143	617,810	1379	600 G	AHJK	CEFGHJ	....	....	B
144	728,834	1977	720 G	AH	ABCDEFGJ	....	....	D
145	732,065	2018	....	ABDEFHJ	....	6	6	ABC
146	818,368	1585	500 G	ABCGHJ	ABCDEFGHJ	30	30	D
147	879,294	1560	650 G	GHK	....	....	....	BD
148	891,129	2168	867 G	ACDEFGHK	ABCEGH	34	34	BD
149	1,015,700	1417	450 G	ABFGHJ	BEFJ	24	28	ABD
150	1,027,473	2131	400 G	ABGHK	ABCDEFGHJ	....	....	DEF
151	1,084,250	2053	960 G	ACFGH	CHJ	....	....	....
152	2,019,750	1127	540 G	H	DF	....	....	....

Lighting for New Homes (5)	Cooperation with Dealers (6)	Lamp Bulb Campaign (7)	Promotional Activity (8)	No.
AB	.....	AB	P	77
.....	.....	.....	N	78
A	ABCD	AB	P	79
AB	.....	.....	P	80
A	BCD	.....	P	81
.....	.....	.....	N	82
AB	BD	.....	P	83
AB	.....	.....	O	84
AB	B	AB	P	85
AB	BCD	AB	P	86
AB	BD	AB	P	87
AB	.....	AB	O	88
AB	B	.....	O	89
AB	.....	A	O	90
.....	.....	.....	N	91
AB	.....	.....	P	92
A	.....	.....	N	93
.....	.....	.....	N	94
AB	BC	.....	O	95
AB	B	.....	P	96
AB	BD	.....	P	97
AB	.....	....	P	98
AB	CD	.....	P	99
AB	.....	.....	O	100
AB	BCD	.....	P	101
A	B	.....	P	102
.....	.....	B	O	103
AB	BCD	AB	P	104
A	BC	B	P	105
A	BCD	B	P	106
A	.....	.....	N	107
AB	.....	.....	P	108
A	.....	B	O	109
AB	.....	AB	O	110
AB	.....	AB	O	111
.....	.....	.....	N	112
AB	.....	AB	P	113
A	CD	.....	O	114
A	C	AB	O	115
A	B	.....	P	116
A	.....	.....	O	117
AB	BCD	.....	P	118
AB	BCD	B	P	119
B	BCD	.....	P	120
AB	B	A	O	121
AB	BCD	.....	P	122
AB	BD	.....	P	123
AB	BCD	.....	P	124
AB	.....	.....	P	125
AB	D	A	P	126
AB	BCD	AB	P	127
AB	.....	.....	P	128
B	.....	.....	O	129
AB	BCD	.....	P	130
AB	.....	.....	P	131
AB	BC	B	P	132
AB	.....	AB	P	133
AB	B	.....	O	134
AB	.....	AB	P	135
AB	BCD	A	P	136
AB	.....	.....	O	137
AB	BCD	AB	P	138
AB	A	A	P	139
AB	B	A	O	140
AB	.....	.....	O	141
AB	B	B	O	142
AB	.....	AB	O	143
AB	AB	B	O	144
A	.....	.....	P	145
AB	BD	.....	P	146
AB	BCD	A	O	147
AB	ABCD	.....	P	148
AB	BC	AB	P	149
A	BCD	.....	O	150
AB	.....	B	P	151
.....	.....	.....	P	152

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ACKNOWLEDGEMENT

Data and other information presented in this survey report represent the home lighting promotion activities of the 177 utilities listed below. The number of replies in the survey is less than 177 because three service organizations, American Gas & Electric Service Corp, New England Power Service, and New England Gas & Electric System, each furnished combined reports on client utilities.

To all who cooperated in this survey, Electrical World offers its thanks.

Alabama Power Co
Amesbury Electric Light Co
Appalachian Electric Power Co
Arizona Public Service Co
Arkansas Power & Light Co
Atlantic City Electric Co
Attleboro Steam & Electric Co

Beverly Gas & Electric Co
Black Hills Power & Light Co
Blackstone Valley Gas & Electric Co
Boston Edison Co
Brockton Edison Co

California Electric Power Co
California Oregon Power Co
Cambridge Electric Light Co
Cape & Vineyard Electric Co
Carolina Power & Light Co
Central Hudson Gas & Electric Corp
Central Illinois Electric & Gas Co
Central Illinois Light Co
Central Illinois Public Service Co
Central Louisiana Electric Co
Central Maine Power Co
Central Ohio Light & Power Co
Central Power & Light Co
Central Vermont Public Service Corp
Chattanooga Electric Power Board
Cheyenne Light, Fuel & Power Co
Cincinnati Gas & Electric Co
Cleveland Electric Illuminating Co
Coast Counties Gas & Electric Co
Colorado Central Power Co
Columbus & Southern Ohio Electric Co
Commonwealth Edison Co
Community Public Service Co
Concord Electric Co
Connecticut Light & Power Co
Connecticut Power Co
Consolidated Edison Co of N. Y.
Consolidated Gas, Electric Light & Power Co of Baltimore
Consumers Power Co
Consumers Public Power District

Dallas Power & Light Co
Dayton Power & Light Co
Delaware Power & Light Co
Detroit Edison Co
Duke Power Co
Duquesne Light Co

Eastern Shore Public Service Co
Edison Sault Electric Co
El Paso Electric Co
Empire District Electric Co

Florida Power Corp
Florida Power & Light Co

Georgia Power Co
Georgia Power & Light Co
Gloucester Electric Co
Granite State Electric Co
Gulf Power Co
Gulf States Utilities Co

Hartford Electric Light Co
Haverhill Electric Co
Houston Lighting & Power Co

Idaho Power Co
Illinois Power Co
Indiana & Michigan Electric Co
Indianapolis Power & Light Co
Interstate Power Co
Iowa Electric Light & Power Co
Iowa-Illinois Gas & Electric Co
Iowa Power & Light Co
Iowa Public Service Co

Jersey Central Power & Light Co

Kansas City (Kan.) Board of Public Utilities
Kansas City Power & Light Co
Kansas Gas & Electric Co
Kansas Power & Light Co
Kentucky Utilities Co
Kentucky & West Virginia Power Co
Kingsport Utilities, Inc
Knoxville Utilities Board

Lawrence Gas & Electric Co
Long Island Lighting Co
Los Angeles Department of Water and Power
Louisiana Power & Light Co
Lowell Electric Light Corp

Madison Gas & Electric Co
Malden Electric Co
Memphis Light, Gas & Water Division
Metropolitan Edison Co
Michigan Gas & Electric Co
Minnesota Power & Light Co
Mississippi Power & Light Co
Missouri Edison Co
Missouri Power & Light Co
Monongahela Power Co
Montana-Dakota Utilities Co
Mountain States Power Co
Mystic Power Co

Narragansett Electric Co
New Bedford Gas & Electric Co
New Hampshire Electric Co
New Jersey Power & Light Co
New Orleans Public Service Co, Inc.
Newport Electric Corp
New York State Electric & Gas Corp
Niagara Mohawk Power Corp
Northampton Electric Lighting Co
Northern Berkshire Gas Co
Northern Pennsylvania Power Co
Northern States Power Co
Northwestern Public Service Co

Ohio Edison Co
Ohio Power Co
Oklahoma Gas & Electric Co
Omaha Public Power District
Orange & Rockland Electric Co
Otter Tail Power Co

Pacific Gas & Electric Co
Pacific Power & Light Co
Patchogue Electric Light Co
Pennsylvania Electric Co
Pennsylvania Power Co
Pennsylvania Power & Light Co
Philadelphia Electric Co
Plymouth County Electric Co
Portland General Electric Co
Potomac Edison Co
Potomac Electric Power Co
Public Service Electric & Gas Co
Public Service Co of Colorado
Public Service Co of Indiana
Public Service Co of New Mexico
Public Service Co of Northern Illinois
Public Service Co of Oklahoma
Puget Sound Power & Light Co

Quincy Electric Light & Power Co

Rochester Gas & Electric Corp
Rockland Light & Power Co

St. Joseph Light & Power Co
Salem Electric Lighting Co
San Antonio Public Service Board
San Diego Gas & Electric Co
Savannah Electric & Power Co
Seattle Dept of Lighting
South Carolina Electric & Gas Co
Southern Berkshire Power & Electric Co
Southern California Edison Co
Southern Colorado Power Co
Southern Indiana Gas & Electric Co
Southwestern Electric Service Co
Southwestern Gas & Electric Co
Southwestern Public Service Co
Staten Island Edison Corp
Suburban Gas & Electric Co
Superior Water, Light & Power Co

Tacoma Dept of Public Utilities
Tampa Electric Co
Telluride Power Co
Texas Electric Service Co
Texas Power & Light Co
Toledo Edison Co
Tucson Gas, Electric Light & Power Co

Union Electric Co of Missouri
United Illuminating Co
Utah Power & Light Co

Virginia Electric & Power Co

Washington Water Power Co
West Penn Power Co
West Texas Utilities Co
Weymouth Light & Power Co
Wheeling Electric Co
Wisconsin Electric Power Co
Wisconsin-Michigan Power Co
Wisconsin Power & Light Co
Wisconsin Public Service Corp
Worcester County Electric Co

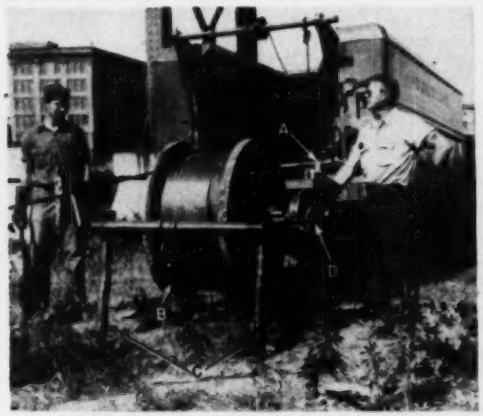


FIG 1—WIRE STRINGING under energized conductors is simplified because of finger-tip control of stringing tension

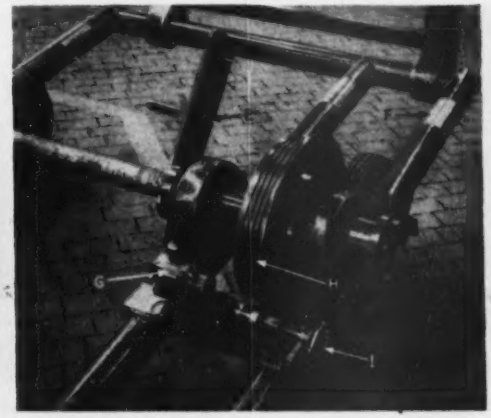


FIG 2—HYDRAULIC BRAKE SHOE permits close control of wire tension. Insulating wood section prevents energizing truck

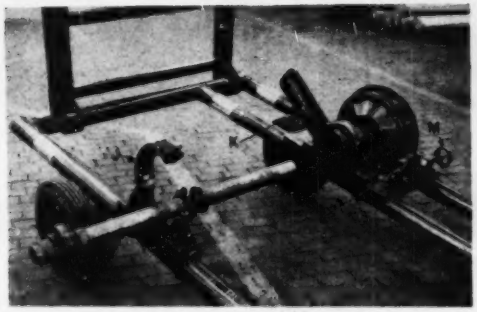


FIG 3—HINGED BEARING permits removal of axle for loading reel. Device is lowered over reel by truck winch

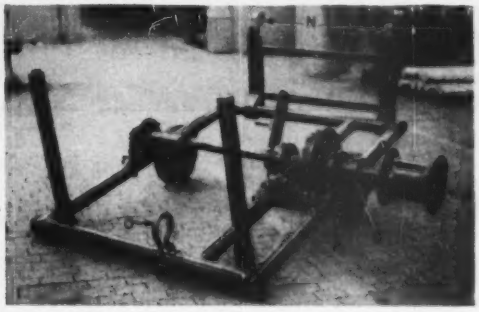


FIG 4—DETACHABLE NIGGERHEAD lines up with winch drum for rope belt operation, when braking is necessary

String Wire Near Energized Conductors

H. H. KORN, Methods Supervisor, Public Service Co of Northern Illinois, Maywood

Safe wire stringing on pole lines carrying energized circuits is made possible by a rig, Fig. 1, that has been especially designed for the purpose. It is equipped with a hydraulic brake shoe arrangement, Fig. 2, controlled by a hand wheel, which permits very close control of wire tension.

To load a reel, the truck is backed up to the reel selected, the axle of the device is removed by opening a hinged bearing Fig. 3, and the device is lowered by the truck winch, the frame dropping over the reel. The axle is threaded through the reel, bearing is closed, and winch line which is fastened to the winch line attachment picks up load for transporting. On arrival at work site, the jacks are adjusted and winch line lowers assembly until load rests on jacks. Brake is adjusted for stringing tension desired and work proceeds.

Fingertip control is kept on wire stringing tension by means of a hand wheel Fig. 3 which applies oil pressure to a master cylinder, which in turn transmits to the slave cylinder actuating brake shoes to drum. A detachable niggerhead can be installed by means of two bolts Fig. 4. Wire or running line can be reeled up with power from the drum of the truck winch. When the niggerhead is used, the two drums line up for rope belt operation.

Two adjustable frame jacks allow for various reel diameters. These jacks are removable and are stored inside the tube frame when being transported. The frame of the rig is insulated from the truck attachment by laminated wood.

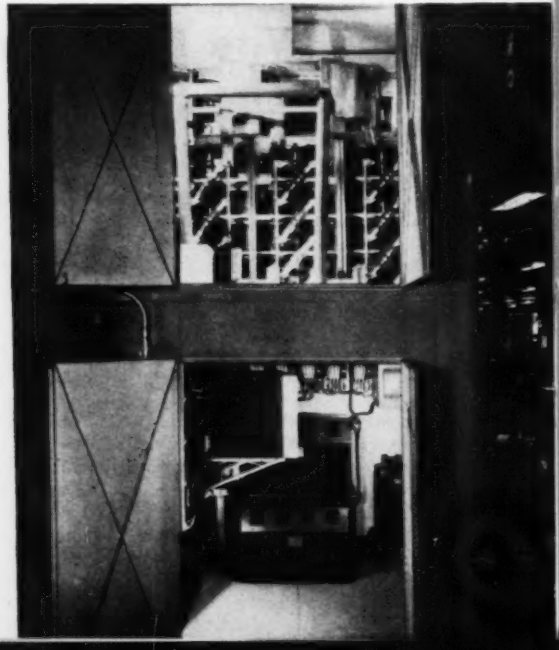
Legend

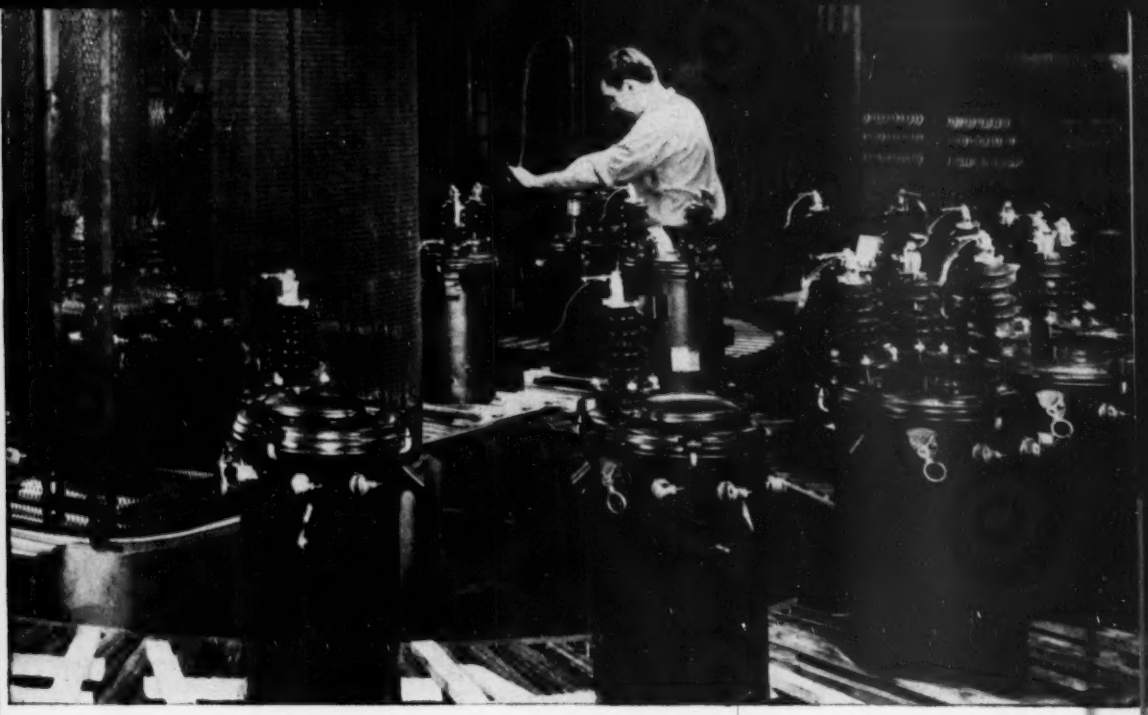
A. Double hinge fits on 2½-in. bar on truck to support weight
B. Winch line attaches for hoisting rig into traveling position
C. Adjustable jacks support weight
D. Handwheel controls hydraulic brake
E. Adjustable dog for engaging reel
F. Laminated wood insulating section
G. Master cylinder
H. Hydraulic brake shoe
I. Hydraulic brake handwheel
J. Hinged bearing
K. Adjustable dog for engaging reel
L. Master cylinder
M. Hydraulic brake handwheel
N. Double hinge
O. Winch line attachment
P. Handwheel
Q. Niggerhead attached by two bolts
R. Detachable niggerhead

Now...production-line impulse testing

AUTOMATIC DETECTION of even minor faults becomes a reality with new impulse-testing equipment which utilizes neutral-impedance method of fault detection for high-voltage windings.

INTERIOR VIEW of new impulse testing equipment showing impulse generator which performs sequences of operations and fault detection automatically . . . at production-line speed.





for G-E Spirakore* transformers

This new quality-control measure gives you added assurance of "extra years of service"

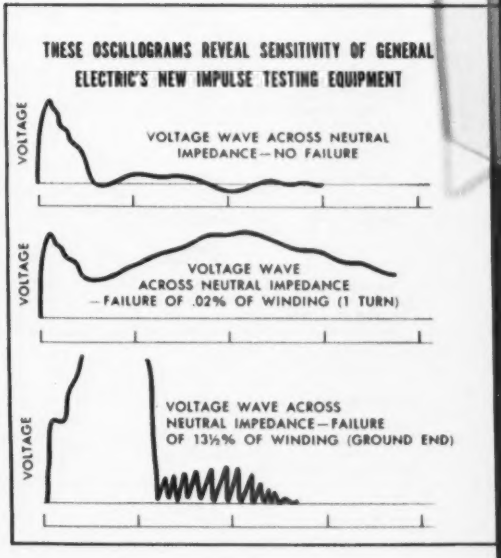
Impulse testing, more exacting than long-established, low-frequency testing procedures, is now being used by General Electric to make sure that your G-E Spirakore transformers will stand up under severe service conditions. More than 185,000 G-E transformers have already been tested right on the production line by this new method.

Production-line impulse testing assures transformers of sound manufacture and provides an additional check on over-all design. Both high- and low-voltage windings are tested without any protective equipment of any kind on the transformer. Any hidden weakness in the transformer is automatically detected and the unit rejected.

TEST RANGE. The equipment now in operation can test all single-phase distribution transformers 100 kva and below with high-voltage windings 18 kv and below, low-voltage windings 600 volts and below.

FOR MORE INFORMATION. GER-635, a reprint of a recent AIEE technical paper, will give you a complete description of this new impulse-testing technique. Ask your local G-E Apparatus sales representative for a copy, or write to Section 402-123, General Electric Company, Schenectady 5, New York.

*Registered trademark of the General Electric Company


THESE OSCILLOGRAMS REVEAL SENSITIVITY OF GENERAL ELECTRIC'S NEW IMPULSE TESTING EQUIPMENT
VOLTAGE
VOLTAGE WAVE ACROSS NEUTRAL IMPEDANCE—NO FAILURE
VOLTAGE
VOLTAGE WAVE ACROSS NEUTRAL IMPEDANCE —FAILURE OF .02% OF WINDING (1 TURN)
VOLTAGE
VOLTAGE WAVE ACROSS NEUTRAL IMPEDANCE—FAILURE OF 13½% OF WINDING (GROUND END)

GENERAL ELECTRIC

Motor Locked Rotor Currents

Data were furnished by manufacturers. Accompanying list consists of ten producers and merchandisers whose products, it is believed, account for the majority of sales throughout the country. Conditioner ratings range from ⅓ to 2 hp.

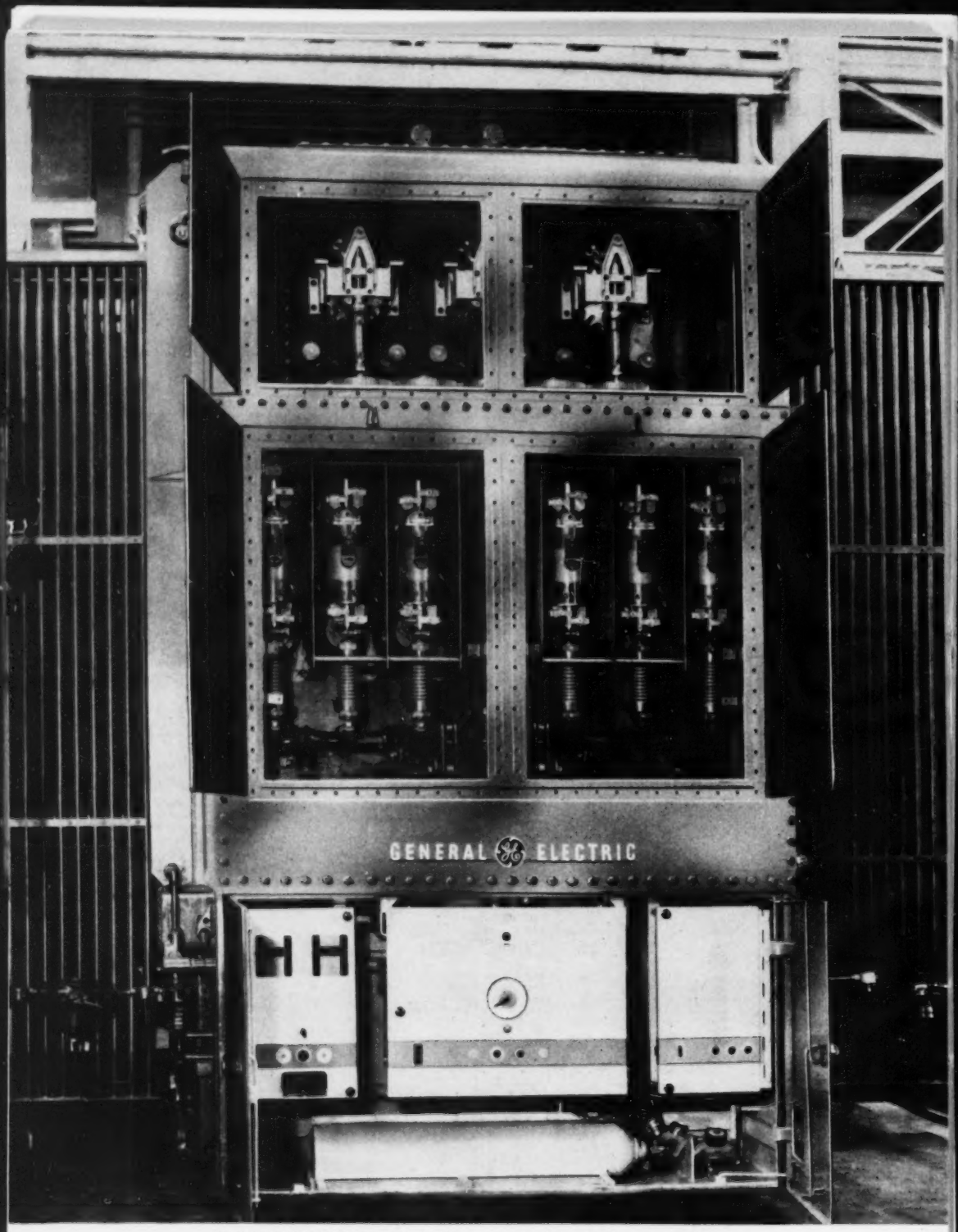
Room Air Conditioner			Motor Locked Rotor Current, Amp, at Rated Voltage				Automatic Control		Remarks
Company	Model	Rating	Compressor	Fan	Fan	Total for motors started simultaneously	No	Yes	
Airtemp Division, Chrysler Corp									
(a) 115-v unit	1675	3/4 ton	43.9	2.5	2.5	46.4			Condenser fan motor and compressor motor start simultaneously
(b) 230-v unit	1600	3/4 ton	32.9			36.0			
Carrier Corp									
(a) 115-v units	51S0	1/3 hp	22.8	1.8	0.60	24.6	N		
	51S1	1/2 "	33.0	1.8	0.60	34.8	N		
	51S2	3/4 "	43.0	2.6	1.2	45.6	N		Condenser fan motor and compressor motor start simultaneously
(b) 230-v units	51S2	3/4 "	23.0	1.3	0.60	24.3	N		
	51S3	1 "	33.0	1.3	0.60	34.3	N		
	51M2	1 "	33.0	9.6	0.80	42.6		y	
	51M3	1-1/2 "	23.0	12.0	2.4	35.0		y	This unit comprises two separate 3/4 hp systems, each compressor motor having a locked rotor current of 23 amp. One compressor and condenser fan start simultaneously
Fedders-Quigan Co									
(a) 115-v units	WH14	1/3 hp	22.8	2.23	....	23.0	N	y	
	WH16	1/2 "	37.2	1.67	0.80	39.4	N		Fedders-Quigan also produces Crosley units with the same general characteristics for the same horsepower ratings
	WH19	3/4 "	44.2	2.45	1.11	45.7	N		
	8A2	3/4 "	44.2	3.25	1.11	46.0	N		
	AC275		44.2	2.45	1.11	45.7	N		
Frigidaire Division, General Motors Corp									
(a) 115-v units	ARO-50	1/2 hp	41.0	11.6	....	43.6	N		This unit comprises two separate 1/2 hp systems. The first control point starts the fan motor; the second point starts one compressor motor; the third point starts the second compressor.
	ARO-100	1 "	41.0	11.6	....	41.0	N		
(b) 230-v unit	ARO-100-2	1 "	20.5	10.0	....	20.5	N		
General Electric Co									
(a) 115-v units	FA5SA1	1/2 hp	35.4	3.65	1.67	35.4	N		Fan motors start before compressor motor
	FA7SA1	3/4 "	43.2	3.65	2.61	46.8	N		Compressor motor and condenser fan motor start simultaneously
	FA7SA3	3/4 "	32.6	3.65	2.61	36.2	N		Current limiter
(b) 230-v unit	FA7SA2	3/4 "	22.1	1.92	1.15	24.0	N		
Mitchell Manufacturing Co									
(a) 115-v units	M-13S	1/3 hp	25.0	1.98	0.63	27.6	N		Fan and compressor motors start simultaneously
	M-12S	1/2 "	35.5	2.4	1.04	See "Remarks"	N		If control switch is turned clockwise, fan motors start prior to compressor motor; if turned counterclockwise, fan and compressor motors start simultaneously
	M-34S	3/4 "	44.0	2.4	1.04	" "	N		
(b) 208-v units	M-208S	3/4 "	25.4	1.35	1.57	" "	N		
	M-1208S	1 "	38.0	1.35	1.57	" "	N		
(c) 230-v units	M-230S	3/4 "	23.2	1.2	1.52	" "	N		
	M-100S	1 "	35.05	1.2	1.52	" "	N		

Note 1: 76-H and 106-H models, not listed above, have locked rotor currents identical with 75H and 105H respectively, but have automatic temperature control. Temperature control changes flow of refrigerant to evaporator but does not start or stop any motors.

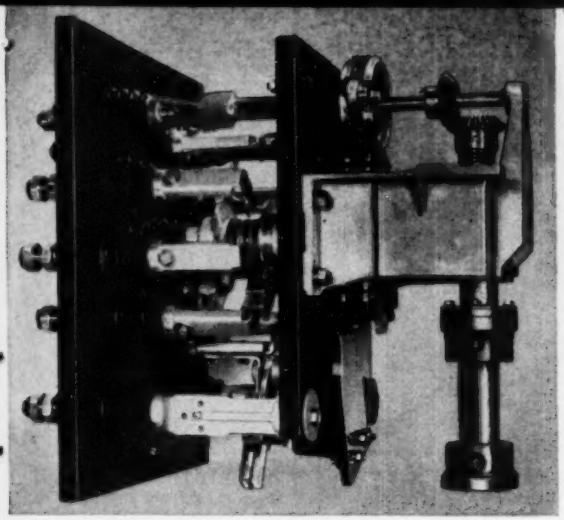
For 1952 Room Air Conditioners

Compiled by J. W. ANDERSON, chairman, EEI Group of ACRMA-EEI-NEMA-REMA Joint Committee on Air Conditioning and Refrigerating Equipment, and presented before Edison Electric Institute, Transmission and Distribution Committee meeting at Chicago, Ill.

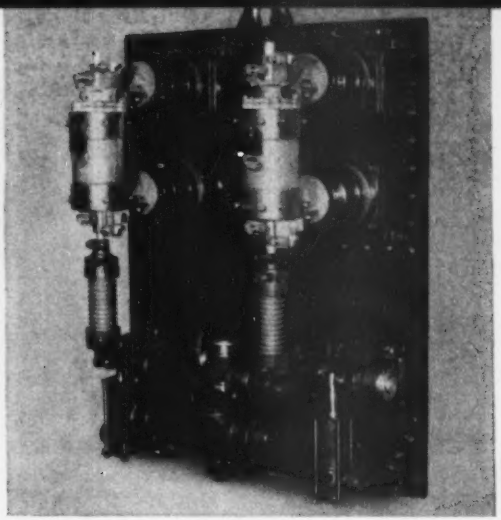
Room Air Conditioner			Motor Locked Rotor Current, Amps, at Rated Voltage				Automatic Control		Remarks
Company	Model	Rating	Compressor	Fan	Fan	Total for motors started simultaneously	No	Yes	
Philco Corp									
(a) 115-v units	33H-1 & 33HL-2 33H-2 & 33HL-2	1/3 hp				26.0	N		
	50H-1 & 50HL-1 50H-2 & 50HL-2	1/2 "				46.0	N		Fan and compressor motors start simultaneously
	75H-1 & 75HL-1 75H-2 & 75HL-2	3/4 "				63.0	N	(Note 1)	
	75H-16 & 75HL-16 75H-17 & 75HL-17	3/4 "				38.5	N	"	Current limiter; fan motor starts after compressor motor
(b) 208-v units	75H-18 & 75HL-18 75H-19 & 75HL-19	3/4 "				34.0	N	"	
	105H-18 & 105HL-18 105H-19 & 105HL-19	1 "				41.5	N	"	
(c) 230-v units	75H-10 & 75HL-10 75H-11 & 75HL-11	3/4 "				27.0	N	"	Fan and compressor motors start simultaneously
	105H-10 & 105HL-10 105H-11 & 105HL-11	1 "				39.0	N	"	
	200-GCW-10	2 "				45.0		•	This unit comprises two separate 1 hp systems. Sequence starter starts No. 1 compressor and evaporator fan motor, and then starts No. 2 compressor. Under moderately high loads No. 1 compressor runs continuously and No. 2 cycles under thermostatic control. Under low loads, No. 2 compressor stops and No. 1 cycles.
Remington Corp									
(a) 115-v units	4A	1/3 hp	23.0	1/40 hp	....	23.0	N		
	6A	1/2 "	39.0	1/40 "	3 watts	39.0	N		
	8A2	3/4 "	46.0	1/30 "	1/100 hp	46.0	N		First position of control switch starts fans; compressor starts on second position, with fans already operating
(b) 230-v units	8A3	3/4 "	23.0	1/30 "	1/100 "	23.0	N		
	10C-129	1 "	33.0	1/6 "	1/25 "	33.0	N		
	12C-129	1-1/2 "	38.0	1/4 "	1/20 "	38.0	N		
United States Air Conditioning Corp									
(a) 115-v units	7950C	1/2 hp	35.5	5.1	....	See "Remarks"	N		If control switch is turned in one direction, fan motor only operates; if turned in the other direction, fan and compressor motors start simultaneously
	7975C	3/4 "	44.0	7.25	....		N		
York Corp									
(a) 115-v units	4-1 & 4-2	1/3 hp				26.0			Fan and compressor motors start simultaneously
	13-1 & 13-2	1/2 "				46.0			
	24-1 & 24-2	3/4 "				63.0			
	24-16	3/4 "				38.5			Current limiter; fan motor starts after compressor motor
(b) 208-v units	24-18 & 24-19	3/4 "				34.0			
	51-18 & 51-19	1 "				39.0			
(c) 230-v units	24-10 & 24-11	3/4 "				27.0			Fan and compressor motors start simultaneously
	51-10 & 51-11	1 "				39.0			
	201-A-10	2 "				45.0			



RUBBER-GASKETED DOORS of this heavy-duty equipment swing open on hinges to reveal the complete accessibility of G-E Load-Ratio-Control. Tap selectors and oil-blast contactors are located in upper and center oil-filled compartments. Air-filled compartment below houses the control center, including motor drive with automatic control, fan control and automatic gas-seal equipment.



TAP SELECTORS are mounted on Herkolite* panels. Transformer tap leads are connected to the backs of the bushing studs eliminating cabling from the compartment. The movable tap selector fingers consist of two parallel bars held in contact with stationary tap shelves by a strong compression spring.



HEAVY-DUTY CONTACTORS utilize oil-blast principle of arc interruption. Accelerator springs assure rapid separation of contacts inside the Herkolite cylinders. The arc is extinguished by pressure which builds up and expels oil and gases through small port. Insulating shafts are corrugated to lengthen creepage paths, increase insulation life.

Inside Story: G-E LOAD-RATIO-CONTROL

Over 39,000,000 installed kva have proved it's as reliable as the transformer itself

This "transformer reliability" results from the complete co-ordination of the four basic factors of load-ratio-control design:

MECHANICAL LIFE. Each new LRC design must pass mechanical-life tests of some 2,000,000 operations—the equivalent of 30 to 40 years of normal service—before we approve it for production.

ARCING-TIP LIFE. Superior arc-resistant qualities are achieved with a tungsten-base alloy. We also test the contacts of each design so that you will know, accurately, when the arcing tips on your equipment will need to be replaced.

INSULATION LIFE. By using vertical insulating surfaces and electrostatic shielding to minimize the effects of oil carbonization, we co-ordinate insulation life and arcing-tip life. This means you have to clean insulation only when you replace the arcing tips.

NORMAL AND SHORT-CIRCUIT DUTY. Each contactor design has been thoroughly tested to define its safe limits of duty under these conditions. Mechanisms are applied to handle the maximum rupturing duty which would be imposed should a short-circuit occur while a tap change is in process.

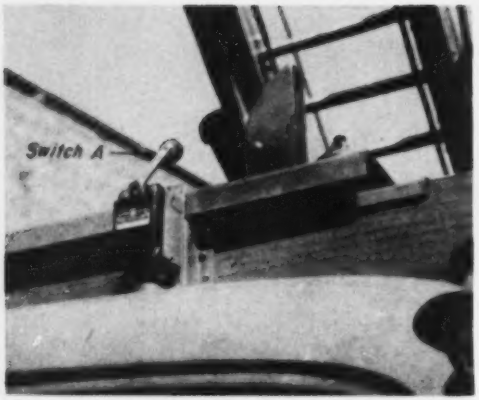
The co-ordination of these basic design factors in G-E load-ratio-control assures you long service, longer periods between inspections, and less maintenance.

MODERN LOAD RATIO CONTROL . . . a factual slide presentation . . . contains more detailed information on load-ratio-control. A G-E Transformer Specialist would be happy to show it at your request. Contact your nearest G-E sales office, or write General Electric Company, Schenectady 5, New York. 401-30

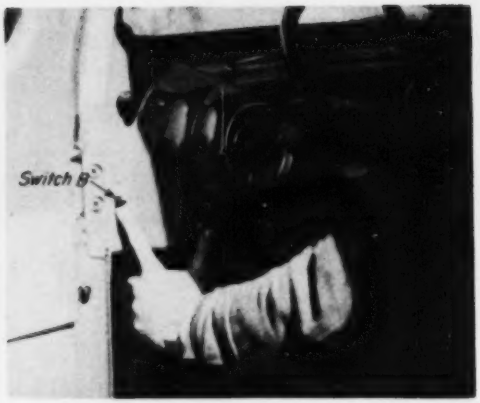
* Reg. trade-mark of General Electric Company.

14 YEARS OF TAP CHANGES without any servicing—that's the prediction for this Indianapolis Power and Light unit—made possible by the co-ordination of insulation and arcing-tip life in G-E Load-Ratio-Control.

GENERAL ELECTRIC



TOP OF TRUCK switch is on open when ladder is in raised position



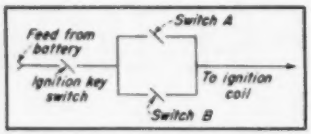
TOGGLE SWITCH is held closed to move with ladder raised

Ignition Interlock Eliminates Ladder Truck Hazards

ANGUS H. BEATON, District Manager, Wisconsin Public Service Corporation, Oconto

Problems involved in starting a ladder truck with the ladder up have been solved on the Wisconsin Public Service Corp system by installing an interlock in the ignition system. Schematic diagram of the system is shown at right.

Switch A is a relay which is controlled by the ladder position. When the ladder is up the switch is open. Switch B is a toggle switch on the dash. The only way the truck can be started when the ladder is up is by holding Switch B in the closed position. This measure is used for moving the truck short distances with the ladder up, such as from one window to another when washing windows. When the ladder is down Switch A is in the closed position and the truck can be started and moved in the normal manner.



SWITCH A is on top of truck and is controlled by ladder position, open when ladder is up. Switch B is on car dash and can be held closed for purpose of moving truck short distance with ladder up

The scheme prevents the driver from starting the truck without realizing that the ladder is in the raised position. This eliminates damage, such as has been caused on some occasions from traveling with the ladder in the raised position.

This idea originated in the company suggestion system.

CLIPS ON RUBBER GOODS have proven to be both an added safety measure and faster means of accomplishing the work

Clips on Pigs Provide Safer Operations

Linemen wearing rubber gloves are accustomed to installing and removing protective rubber equipment, "pigs," while working feeders hot. Idaho Power Co has figured out a better and safer way to do the job, thanks to Foreman H. A. C. Evans and his line crew. By fastening plastic harness rings onto the rubber equipment with cold tire patches, they can use a switch stick to pull the line hose off the conductor and the hood off the insulator.

The company's safety director points out that rubber goods are frequently installed on a pole that is comparatively clean. Subsequently transformers, cutouts, and other apparatus are installed on the pole making it more hazardous to remove the rubber protective equipment than it was to install it.

In the equipment illustrated, three layers of cold patch were used to give the attachment sufficient strength. A tip on using this device is to try placing the ring on the insulator hood just a little off center. It should make for easier removal of the hood from the insulator.

Photograph of a section of a failed tube showing excessive thinning and pitting of the outer surface. Note also the circumferential cracks.

CORROSION STUDIES CAN INCREASE THE ECONOMY OF COPPER ALLOYS

Copper and its alloys are notable for their resistance to corrosion under a wide variety of conditions. There are industrial applications where copper or the appropriate copper alloy should give an indefinitely long life, but where failure because of corrosion may result by reason of unsuitable design of equipment or improper control of environment. Further, there are many situations in which no commercial metal or alloy will have an extended life, but in which copper or one of its alloys possesses a combination of physical and chemical properties which render it the best obtainable material, when all factors, including ultimate costs, are taken into consideration. Hence correct specification becomes of great importance. Recognition of this by industry is responsible for the fact that the Revere Research Department devotes so much time to studying the corrosive effects of fluids and gases, and to preventive measures.

Recently a large manufacturer, who produces condensers as well as other equipment, reported that arsenical Admiralty tubes in a steam-jet ejector were failing after five years. This length of service is not too bad, but nevertheless such tubes often last much longer. Could we make any suggestions?

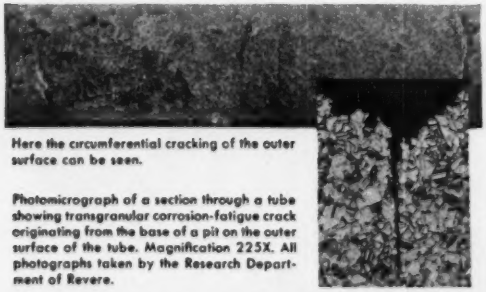
Seven failed tubes were examined for type of corrosion, metal and scale analysis. The facts were: outer surfaces were badly pitted and grooved with holes completely through in some areas; the inside surfaces were relatively untouched; cracking was circumferential, progressing from the outside; outer scale was largely cupric carbonates and copper sulfide; inner scale was calcium carbonate, cuprous oxide and some iron oxide. Microscopic examination of the cracks showed they originated in corrosion pits on the outside, progressing inward across grain boundaries, rather than along them. The transgranular path of fracture, together with other characteristics of the microstructure, definitely established the fact that the failure was of the corrosion-fatigue type. The corroding pits on the outside created stress concentration points of weakness, from which the cracks originated. Eventually the localized stress exceeded the endurance limit of the metal and it cracked.

The conclusion was, therefore, that damage was from two sources—the first being excessive carbon dioxide and the other non-condensable gases in the steam, which caused the excessive pitting and thinning. It is not ununusual to have these and other corrodants present in damaging amounts in the air-ejector system, whereas they are not injurious elsewhere. The second cause of failure was excessive vibration somewhere in the unit which was responsible for the corrosion fatigue failure.

RECOMMENDATIONS. The copper-base tube alloy that generally possesses the greatest resistance to the non-condensable gases responsible for the corrosion of the Admiralty tubes is 5% aluminum bronze. Re-tubing with this was suggested. It was also recommended that steps be taken to effect a material reduction in tube vibration by placing a baffle in the steam inlet. In addition, it was pointed out that many operators find it good practice to discharge the after-condenser drain to the sewer instead of returning it to the system. By this means, the amount of carbon dioxide, ammonia and other gases in the system can be substantially decreased.

* * *

It is interesting to note that the Revere Research Department, located in Rome, N. Y., was able to determine these causes and suggest remedies without ever having seen the condenser. This is the result of modern equipment, and long experience in studying the problems of corrosion. If you have a problem regarding the corrosion of copper and copper alloys, or aluminum alloys, why not take it up with the nearest Revere office? Remember, corrosion that is too rapid wastes both your money and our national resources.



Here the circumferential cracking of the outer surface can be seen.

Photomicrograph of a section through a tube showing transgranular corrosion-fatigue crack originating from the base of a pit on the outer surface of the tube. Magnification 225X. All photographs taken by the Research Department of Revere.

REVERE
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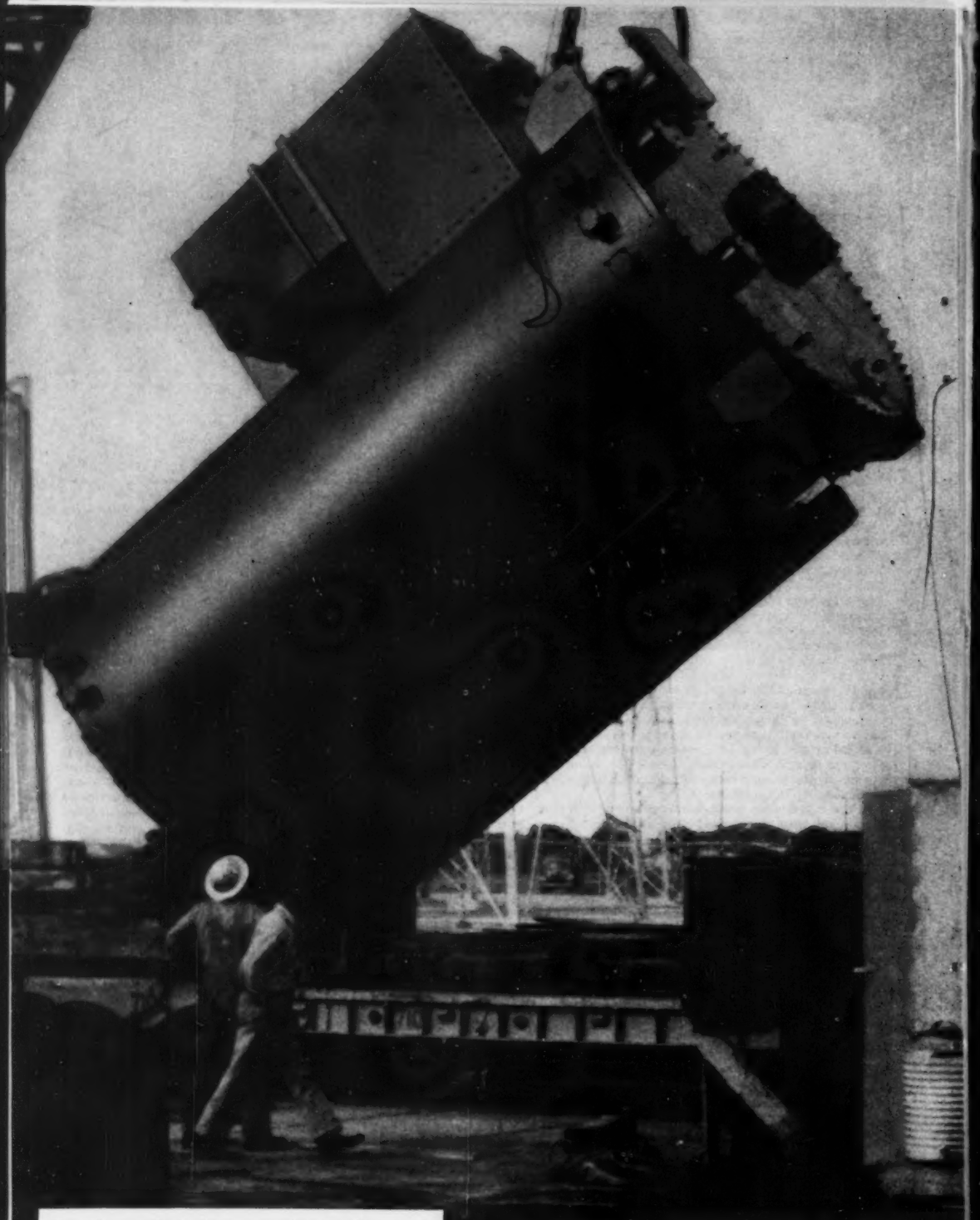

One of seven single phase corona-free transformers of Southern California Edison Company's substations. Each unit is rated 30,000 kva, 127.1/220 kv — 72 kv with load ratio control in the low voltage winding.

CORONA-FREE DESIGN

PRESCRIPTION for
LONG TRANSFORMER
LIFE :
CORONA
DESIGN
INSULATION THAT COULD LAST for years deteriorates under the impact of corona. By charring insulation and making it conductive, corona progressively steals life from your transformer.
WHAT ABOUT CORONA-FREE DESIGN?
Corona-free design prevents corona from forming even at the highest test voltages. Your transformer keeps full insulation strength in windings, tap changers, terminal boards and other parts because they are kept free from corona's injurious effects.
Allis-Chalmers corona-free design removes an obstacle to long transformer life. For the years ahead it provides the strength and performance you originally specified. It keeps your transformers young. Allis-Chalmers, Milwaukee 1, Wisconsin.
A-3799
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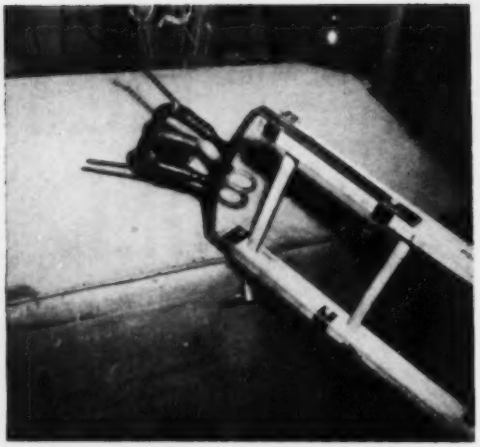
A-C
ALLIS-CHALMERS
KEEPS TRANSFORMERS YOUNG

MAKING MID-SPAN TAPS on long secondaries is easily done from a special ladder that does not deflect messenger from normal position



DETACHABLE HOOK END on ladder has horns to guide lines between hooks; 90-deg turn of ladder sets it in place with hooks over lines

Make Mid-Span Taps With Special Ladder

A. D. FRAGALL, Asst Distribution Engineer, Portland General Electric Co

Mid-span service taps on 250 to 300-ft, messenger-supported spans can be made or repaired through use of a special ladder designed by Portland General Electric Co. This ladder frees ladder trucks or mechanical-lift equipment for use in street lighting and tree trimming work. It also makes possible installation of long-span construction on rear property lines where vehicles cannot be used.

The ladder was developed for use on the company's experimental long-span installations, which are suspended and spun on secondaries. It is designed so that the lineman's weight on the ladder is in line with the messenger. Thus a lineman can work on the secondary or service connection without deflecting the messenger from its normal position. Proper sagging of services which have been deadended at the house is no problem with this ladder.

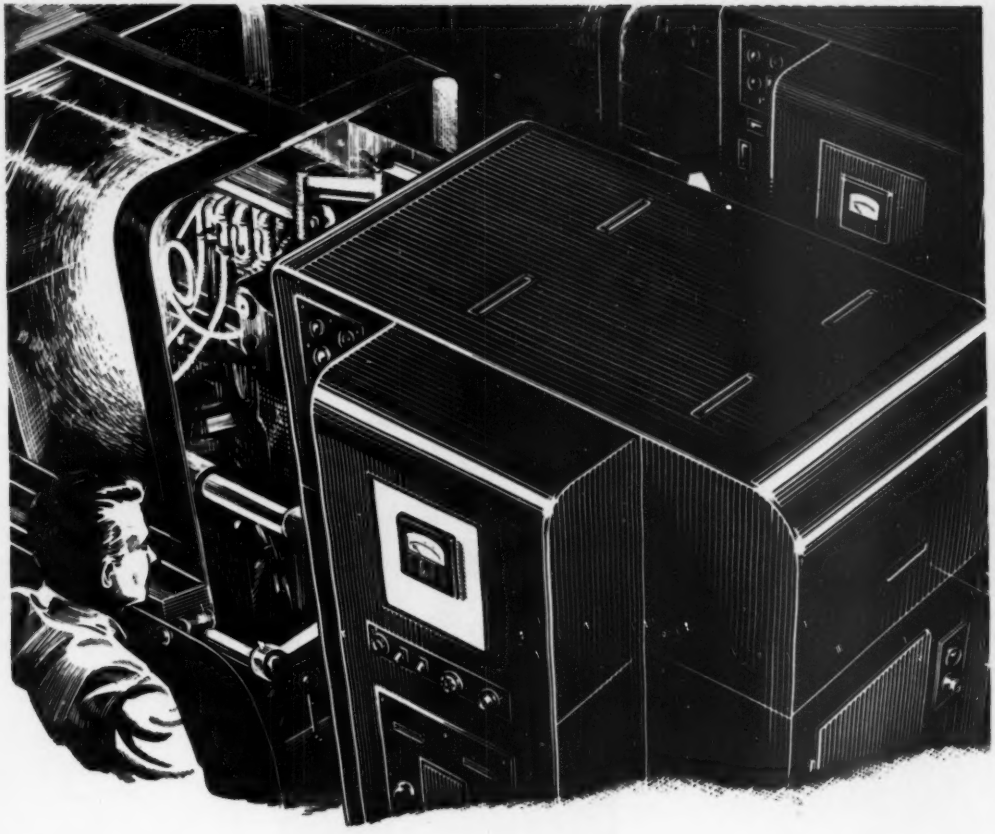
A light weight (spruce) 28 or 32-ft extension ladder is used. An easily detachable head, or hook end, developed by A. S. Renie and John Miles in the company shop, is attached to the ladder by ¼ x 1½-in. strap iron bolted at one end and fastened with a loop of 10-gage metal. The head is attached so that the lineman's weight tends to compress rather than split the wood.

Horns on the hooks help to guide messenger and secondary between the hooks. With the messenger between the hooks, the ladder is turned 90 deg and set with the messenger in the proper position. Hooks are bent in opposite directions and spread about 3 in. apart. They are set at a slight angle so that each lends support and stability to the ladder. Hooks are of ¾-in. round stock bent on about a 2½-in. radius and extend about 4½ in. from the bend. To avoid damage to secondary insulation, ¾-in. water hose is slipped over metal parts and carefully taped. A loop under the hooks provides for a snubbing line. Total material and labor cost of this hook attachment was only about $5.00.

Hydraulic Jack Speeds Dead End Clevis Installation

50 OR 100-TON HYDRAULIC JACKS supplied by gasoline driven, double action hydraulic pump swedge on aluminum deadend body

COMPLETED DEADEND is good example of versatility of the setup. Dies for the jacks are made locally, other equipment is standard



Stethoscopes for Production Machines

More than likely, you think of an ammeter simply as an instrument used to directly measure electrical current . . . without any thought that this same instrument also serves to furnish visual evidence of *what's going on inside vital production machines.*

Built into high-speed and automatic machine tools, for example, the pointer on a WESTON ammeter warns when tools are losing their cutting edge . . . when tools are set to take too deep, or too fine a cut . . . or when some other unseen condition might retard production or overload the motor.

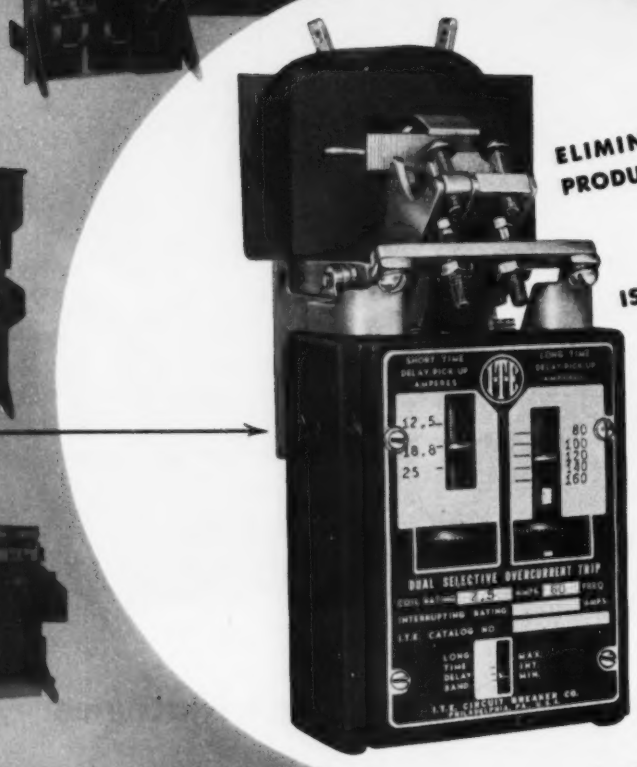
With instrument warning of these *symptoms* in their early stage, the operator can quickly make necessary adjustments or corrections *before* serious losses occur. Thus excessive maintenance, spoilage and down-time are forestalled . . . assuring a continuous, high output of quality parts.

And in *all* industries, the use of *built-in* instruments is rapidly growing . . . from simple ammeters for monitoring machine tools, or ratio meters which indicate the *percent stretch* of yarn and textiles, to large banks of recording and controlling instruments for complete processing requirements.

For *all* these applications, in *all* industries, WESTON supplies the instruments that are pointing the way to new goals in increased output, in improved quality, and in lower costs. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, N. J., manufacturers of Weston and TAG instruments.

WESTON TAG 9464 **WESTON** *Instruments* INDICATE — RECORD — CONTROL

SERVICE CONTINUITY



ELIMINATES COSTLY PRODUCTION BREAKDOWNS

ISOLATES SYSTEM FAULTS

SAVES UP TO 63% ON INITIAL INVESTMENT

Direct-Acting Selective Overcurrent Trip Devices are available for I-T-E KA, KB, KC, and LG type circuit breakers in the following ratings:

15,000 to 100,000 amperes interrupting capacity

100 to 6000 amperes continuous

MODERN I-T-E DIRECT-ACTING SELECTIVE TRIP BREAKER PROTECTION

It's easy to protect production and profits against disastrous total power failure in complex electrical distribution systems. The cost is lower than you think.

Modern Selective Tripping—pioneered and developed by I-T-E—eliminates the failings of inadequate systems which can tie up an entire plant or utility with a single short somewhere along the line.

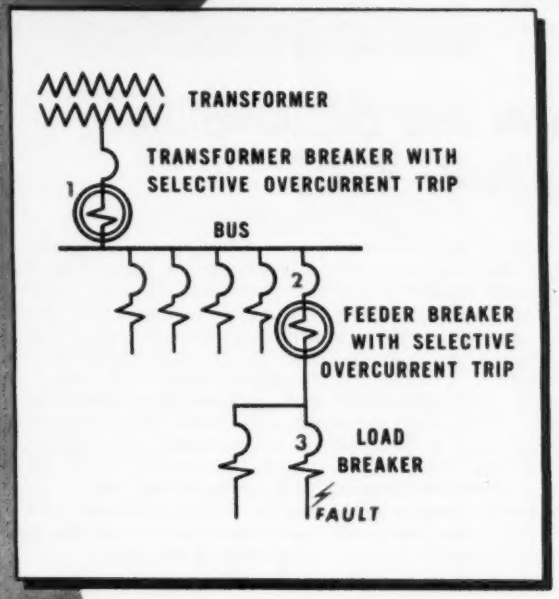
Selective Tripping limits the fault to *one* affected area only. Production continues—*uninterrupted*—throughout the rest of the system.

I-T-E TRIP DEVICE SAVES 63% ON INVESTMENT

Secret of this efficient delayed-action circuit breaker protection is the I-T-E *Direct-Acting* Selective Overcurrent Trip Device. Developed by I-T-E engineers to replace complex, expensive transformer-relay auxiliary apparatus, this unique tripping device gives one more reason for I-T-E leadership in the design and application of quality circuit breakers and switchgear.

Positive—compact—dependable, the low-cost I-T-E Trip Device saves you up to 63% on accessory cost per circuit! And because it is a *direct-acting* device—an integral part of the circuit breaker—no additional space is required on your switchboard panel. Assure service continuity. Install I-T-E Selective Tripping in *your* plant.

COSTS LESS THAN YOU THINK



HOW SELECTIVE TRIPPING WORKS

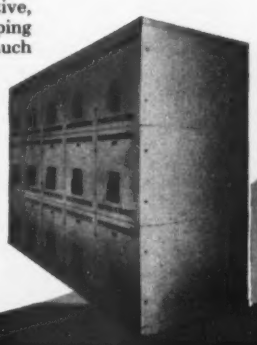
I-T-E circuit breakers, arranged in series, are *preset* to open in *definite sequence* (3, 2, 1 in diagram). If there is a sudden overcurrent or short circuit in any branch of the system, only the breaker (3) closest to the fault will open. Other breakers—other production machinery—in the system are unaffected.

ANOTHER I-T-E "FIRST"

Here is one more I-T-E "first"—another major I-T-E development to help industry protect production and save. Originally developed for the Navy during the War, the I-T-E Direct-Acting Selective Overcurrent Tripping Device has since been refined and perfected for industrial and utility use.

Call on I-T-E engineers—specialists in circuit breakers and switchgear—to see how positive, dependable I-T-E *Direct-Acting* Selective Tripping can protect your plant operation. See how much you can save.

For selection and application data on I-T-E large air circuit breakers, including selective tripping arrangements write for Catalog Section 1003 today. I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Phila. 30, Pa.



I-T-E

LOW-VOLTAGE SWITCHGEAR

I-T-E CIRCUIT BREAKER CO. · 19TH AND HAMILTON STS. · PHILADELPHIA 30, PA.

CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO · EXPORT SALES: PHILIPS EXPORT CORP., N. Y. 17, N. Y.

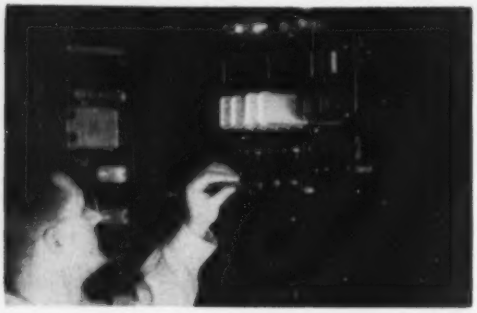


Fig 1—ADJUSTING damping control on electronic voltage regulator. After each adjustment, an oscillograph is made of disturbance

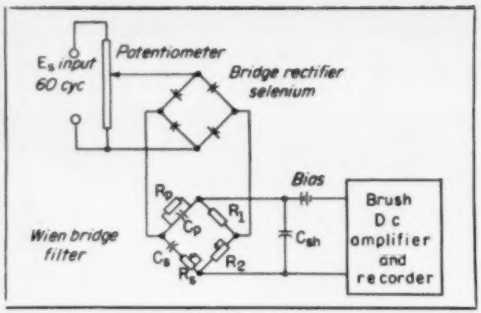


Fig 2—WIEN BRIDGE circuit used as a quick response filter for recording a transient alternating voltage as a dc quantity

Magnetic Oscillograph and DC Amplifier Speed Voltage Regulator Tests

CHARLES J. MANNER, Engineering and Service, Westinghouse Electric Corp, Los Angeles, Cal.

A method of making immediately readable precise records of a slightly variable alternating voltage has been devised. This is highly desirable in the study of voltage regulating systems. It is accomplished by using the Brush double-channel magnetic oscillograph and dc amplifier. It permits an ac quantity to be recorded as a dc measurement without the usual errors of pen lag and overshoot of graphic meters, or the inconvenience of preparing photographic film.

While the conventional method of using the magnetic oscillograph with photographic film is excellent, it is time consuming and entails considerable hand measurements to reduce the sine wave trace to simple graphic form.

With this new method, the input signal to the amplifier is obtained from a metallic rectifier and a Wien bridge-type filter. The bridge filter (Fig 2) is used because of its exceptionally low time constant. The elements of the bridge are selected so that the impedance of the parallel RC leg is equal to the impedance of the series RC leg at the ripple frequency of the single phase bridge rectifier.

The series equivalent of the capacitor and resistor in parallel may be expressed as follows:

$$R_S = R_P \frac{1}{1 + W^2 C_P^2 R_P^2}$$

$$C_S = C_P \left(1 + \frac{1}{W^2 C_P^2 R_P^2}\right)$$

Where: R_P and C_P are the resistance and capacitance in parallel R_s and C_s are the resistance and capacitance in series. W equals 2 π times the frequency in cycles per second.

Then with R equal to R_s the output terminals of the bridge are at equal potential points of the circuit for the ripple frequency but are proportionately different for the d-c input. The bridge therefore provides an effective filter with a time constant determined largely by the RC time constant of R_s plus R_r and C_s.

In constructing a filter of this type, elements should be selected to give a time constant of about .01 to .02 sec. This is considered to be adequate response for voltage regulator testing. The time constant represents the time required for the recording pen to reach 63% of the final deflection.

The ripple of a single phase bridge rectifier contains frequency components other than the fundamental. Consequently the bridge type filter output contains about 1% ripple at the optimum adjustment of R_s and R_p. This is acceptable for normal recording when the total ripple is only 1% of the pen deflection. However, the 1% ripple becomes intolerable when the output of the filter is biased 100% so that the system can be adjusted to amplify and register plus or minus 10% changes in the variable quantity for full scale deflection. This system of biasing provides the advantages of a suppressed zero scale.

A shunt capacitor equal in capacity to C_s can be placed across the output terminals of the bridge filter and thereby reduce the output ripple to less than 0.2%. This results in practically no sacrifice in the overall time constant.

Fig 3 demonstrates the overall response of the circuit to an alternating voltage of 60 cycles per sec that was switched on an off. One element of

(*Continued on page* 153)

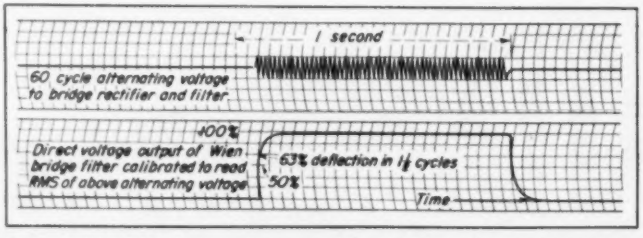

1 second
60 cycle alternating voltage to bridge rectifier and filter
100%
Direct voltage output of Wien bridge filter calibrated to read RMS of above alternating voltage
63% deflection in 1½ cycles
50%
Time

Fig 3—OSCILLOGRAM shows overall response of the circuit to a 60 cycle voltage that was switched on and off. Both voltages fed to the oscillograph elements

HI-TENSION NEWS *Junior*

A. G. & E. Applies Standard O-B Components to 330-KV Construction

● Conception and construction of a huge 330-kv trunk transmission line, interconnecting many points of economical generation with centers of great demand, is such a major advancement in American power facilities that the project itself may overshadow some of its significant details . . . On this line, the first of its kind in the U. S., Appalachian Electric Power Company, a subsidiary of American Gas & Electric Co., has adapted service-tested components and practices to a project radically new in size and voltage . . . . Since O-B was privileged to participate in both the early research as well as the actual construction of this line, it is a matter of interest that regular 15,000 and 25,000-pound O-B insulators were used. Likewise, O-B Cooline suspension clamps, embodying standard design, were employed. The use of a simple corona shield made possible this conventional, economical hardware practice . . . . Illustrated here is one of the 18-unit O-B suspension strings being clipped-in, along with a Cooline clamp and O-B shield . . thus applying proven standard practices to a new conception of power transmission.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

In a mountain meadow of the Far West stands this frame-mounted 69 kv Pacific Electric oil circuit breaker, one of five of this type recently installed at this substation by a prominent utility. According to its builder . . . "the breaker is electrically and mechanically trip-free in any position, and reclosing is always from fully open position thereby assuring maximum interior insulation during the critical surge time that follows an interruption caused by repetitive lightning. Other Pacific features include low operating current (not exceeding 12 amp at 125 v d-c), fast and simple latching, sliding-shoe (finger) contacts in nested sets of four," . . . AND . . .

O-B BUSHINGS

One of the Finest Components of Any Circuit Breaker

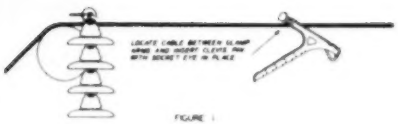


FIGURE 1

FIGURE 2

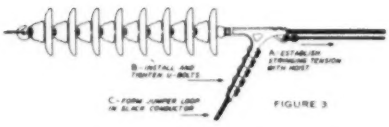


FIGURE 3

Figures 1, 2, and 3 - - Method of installing Hi-Lite clamp by use of stringing eye.

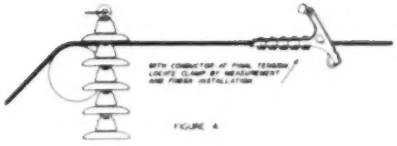


FIGURE 4

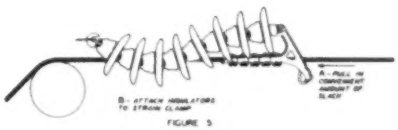


FIGURE 5

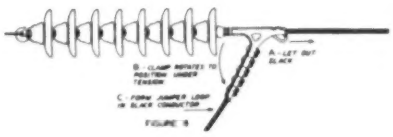


FIGURE 6

Figures 4, 5, and 6 - - Method of installing Hi-Lite clamp by utilizing conductor tension.

IT'S EASIER TO BUILD UNCUT JUMPERS ...AND A WHOLE LOT BETTER!

When you build transmission line jumper loops at strain points, don't cut the conductor! Satisfactory splices at these points are rare. It takes longer to build spliced jumpers, costs more, and all you get for your effort is trouble.

O-B Hi-Lite strain clamps, either in malleable iron or non-magnetic Cooline type, attach to the continuous conductor cable with an easily-made and easily-inspected bolted connection. They will develop adequate slipless holding power with big safety factors. They permit you to check this condition any time in their life. Inherently low in cost, they save construction time and produce trouble-free continuous jumpers. Two alternate ways of installing Hi-Lite clamps are shown here, in order to illustrate their simplicity.

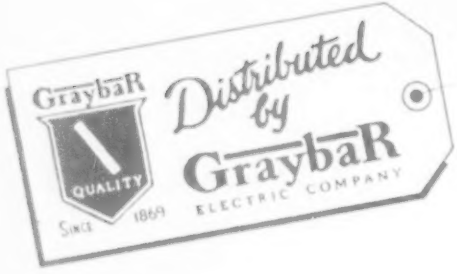
Specify O-B Hi-Lites on your next transmission project and build trouble *out* of the system!

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

How to Get More Than Five Year's Use From This Insulator!



If we told you that an O-B six-inch suspension insulator might not last five years, you would rate it as a poor buy - - but this can be exactly the case. A primary deadend, built today with one six-inch unit, for operation up to 4,000 volts, may serve adequately. But, residential demand has risen 300 per cent in only ten years, and it may double again in the next five, according to many authorities. Will 4,000 volts supply this demand? If not, the deadend must be rebuilt, because it didn't last five years!

Suspension insulators, as a mechanical device, are indefinitely durable. The same can't be said, however, about the plans on which their use is based. If you want reasonable service from primary deadends, build them just once instead of *twice* - - build them with *two* insulator units that will handle 12,000 volts without further attention or expense. It will save you money in the end.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

4232-H

(*Continued from page* 148)

the oscillograph was connected to record the dc input to the bridge rectifier, and the other element the output of the bridge filter. The chart speed for this test was 0.08 sec per centimeter and the overall time constant was approximately .02 sec. The addition of the shunt capacitor increased the time constant to approximately .025 sec.

The output of the rectifier and filter is not linear at low voltages but is sufficiently linear at 3 to 10 v that the biased output system can be used successfully on the standard linear charts.

Filter Aid Cleans Oil Of Heavy Sludge

L. BASKETTE, Senior Chemist, Engineering Dept, Southern California Edison Co, Los Angeles

Use of diatomaceous filter-aid when filtering sludged and heavily carbonized insulating oil:

1. Overcomes the common field experience of having filter press papers clog with sludge and carbon within a few minutes of operation.

2. Makes possible a saving of about 30% in use of filter paper and cuts filtering time about 30 to 40%.

3. Requires only a slight change in the filtering procedure when using standard filter equipment.

This material is a diatomaceous silica composed largely of acicular (needle-like) and elongated diatoms, a microscopic aquatic plant. As supplied commercially it is a light-weight, amorphous, fluffy, inert material. It is practically pure silica free of moisture and has extremely large surface area.

When suspended in the oil to be filtered, filter-aid deposits in strawpile fashion as a porous filter cake. As the liquid is strained through the microscopic openings, even the smallest colloidal particles are caught. Normally colloidal carbon and sludge produce a slimy surface coating on filter paper which clogs the pores and prevents passage of oil.

Filter aid overcomes this action by forming a light precoat on the paper and a subsequent build-up of a porous cake as the oil passes through. When the press space is filled, the filter cake may be removed, the same papers used again, a new precoat applied and the process continued.

Results of using filter aid in the

count to 10

and YOU WILL SPECIFY BROWN BOVERI *Quick*STOP Motors

1- These are combination BRAKE & DRIVE, all-in-one units designed for rugged industrial service.

2- No outside power source or special controls needed for applying or releasing the brake.

3- Release brake and starts instantly when power is applied.

4- Stops and brakes with 15% of normal torque when power is cut.

5- No Creep — No Backlash

6- Can be reversed like any standard 3-phase motor.

7- Mounts vertically or horizontally for forward on reversing operations.

8- Minimum maintenance.

9- Available as a drip-proof motor from .3 to 8 HP; as a totally enclosed motor from .2 to 4 HP.

10- World-famous for its trouble-free performance.

Planing machine using QuickStop Motors on feed and tool slide adjustments. To 1,000 starting and braking operations per hour.

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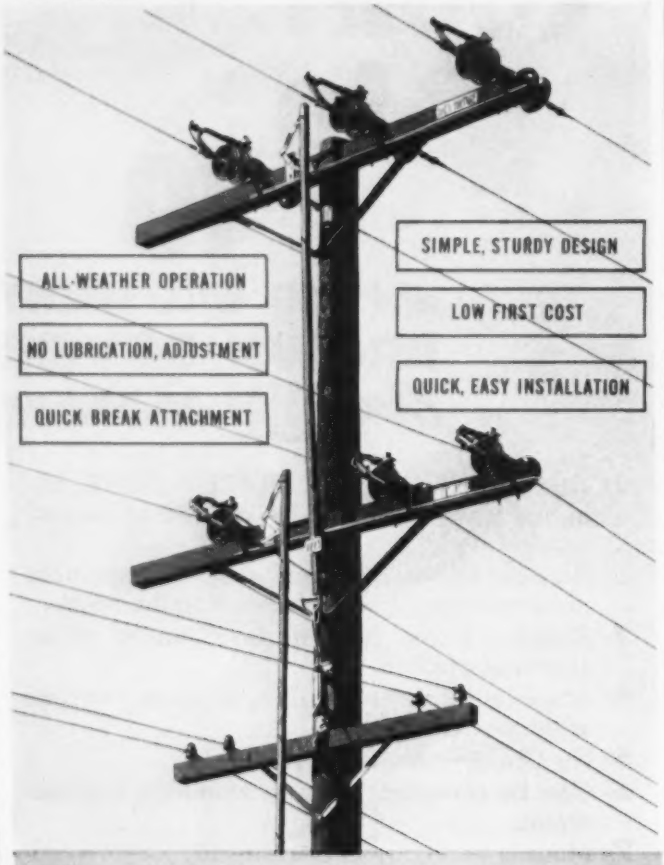
KPF POLE TOP SWITCHES



MORE SWITCH FOR LESS MONEY

KPF Pole Top Switches cost less to buy and give longer service because they are simplest in design, sturdily built. They need no separate deadends, no "extra" insulators. Simple "3-step" installation saves man hours—(just bore holes in cross-arms, tighten bolts, attach connectors). Insulator stacks easily adjusted for line sag. Free-floating, self-aligning, silver-surfaced blades always maintain proper contact. Vertical, horizontal or triangular mounting. Write today for Catalog, details of KPF switches.

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KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton 5, Calif.

oil house and repeatedly in the field have been favorable. Filter-aid precoat should be applied at the rate of 10 lb per 100 sq ft of filtering area. It was found that 3 lb gave a satisfactory precoat for the standard 12-in. press. With a press full of oil and 20 gal of oil in the press tank to allow circulation through the press without sucking air into the system, 3 lb of filter aid was mixed in a separate 5 gal of oil and added to the oil in the tank with continued circulation. After a short time all the filter aid was deposited on the papers in a precoat and the press was ready for operation.

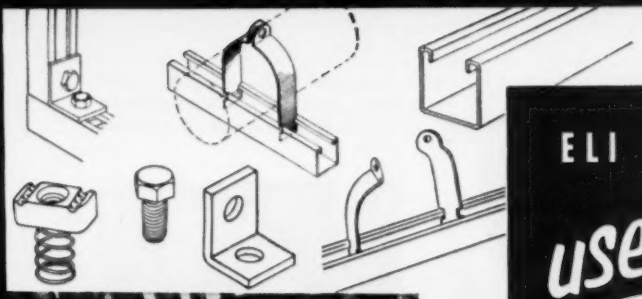
Density of the wet filter cake is about 18.5 lb per cubic foot. Free space in the press will thus hold about 23 lb of filter aid cake. Allowing 3 lb for the precoat and assuming the impurities in the oil are equal to the filter aid added, about 10 lb of filter aid could be used with the oil before cleaning the press. With oil containing 0.1% suspended matter, about 1300 gal of oil passed between cleanings. Correspondingly larger quantities of oil containing less impurities could also be passed between cleanings.

To check whether filter aid had any dehydrating effect on wet oil, samples of dry oil and wet oil were filtered. Dry oil with a dielectric strength of 37 kv was shaken with filter aid to form two samples, 0.1% filter aid and 10%. Two samples of wet oil with a dielectric strength of less than 5 kv were prepared with similar amounts of filter aid. Results showed that dry oil is not affected by any quantity of filter aid after settling clear and that for practical purposes, filter aid has no appreciable drying action on wet oil.

In general practice, Southern California Edison uses filter aid only after a severe interruption in an oil circuit breaker has produced a heavy carbonization of oil.

Display Explains Watthour Meter

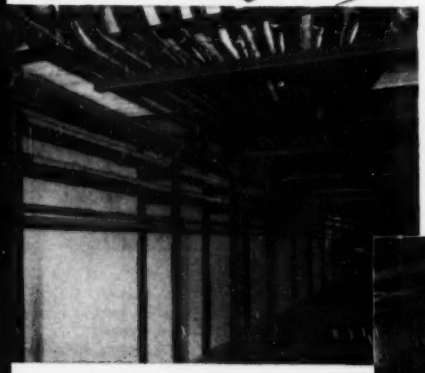
An electric load display board is used by California Electric Power Co, Riverside, to explain the principles and construction of the watthour meter and to show the effect various loads have on the electric bill. Jim Stocks, three-phase meter tester for the company, built the board and uses it in



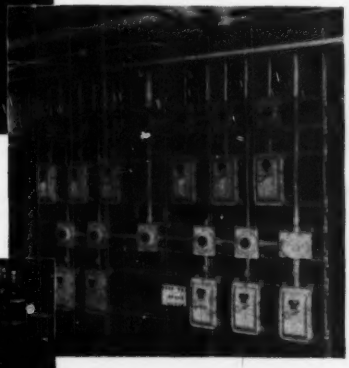
ELI LILLY AND COMPANY

use UNISTRUT®

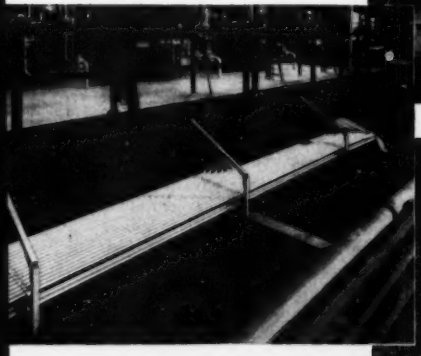
METAL FRAMING



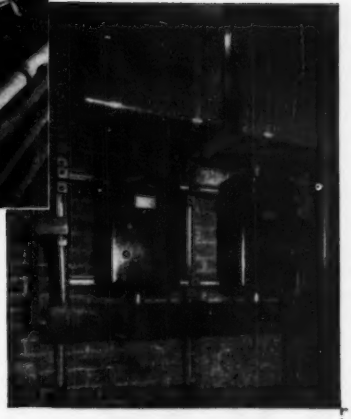
Stanchions and trapeze supports of UNISTRUT carry high voltage and metering conduits in a Lilly tunnel installation.



Load Center in Glandular Products section. Note how flexible UNISTRUT permits gear to be installed in exact location desired.



Here UNISTRUT carries heavy banks of conduit leading to motors in the penicillin fermentation area.



First UNISTRUT installation made at Eli Lilly, in 1942, supports motor controls for pumping equipment.

in countless plant maintenance jobs!

STOCKED IN ALL PLANTS AS STANDARD SERVICE STORES ITEM

Lilly uses UNISTRUT to

- ★ **Rack Conduit, Cable and Mechanical Piping**
- ★ **Frame Power Load Centers**
- ★ **Mount Switches, Meters and Panelboards**
- ★ **Support Fluorescent Fixtures**
- ★ **Construct Assembly Tables and Conveyor Supports**

LILLY maintenance men find completely adjustable UNISTRUT all-purpose metal framing easy to handle and quick to erect, providing great strength without bulk. Adjustments, changes, and additions are easily made at any time.

UNISTRUT cuts costs, too. You save time in engineering detailing and eliminate the need for trained erection crews —anyone can build with UNISTRUT. No drilling, no welding, no special tools or equipment—all you need is a hacksaw and a wrench. It will pay you to stock UNISTRUT as a maintenance material.

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The World's Most Flexible All-Purpose Metal Framing.

Representatives and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

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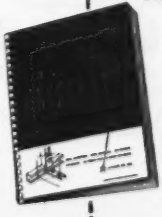

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☐ New Catalog No. 700 ☐ Wall Chart
☐ UNISTRUT Sample

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Directors' Meeting ...THE MORNING AFTER

In the middle of the night fire hit here with sudden blasting fury. In *seconds*, it turned vital equipment into smoking junk. Next morning the directors could rightfully ask, *"Where was our fire protection?"*

Unfortunately, it lay in a desk drawer—a proposal for a fire extinguishing system that would have made the key hazards at this plant fire-safe. Procrastination pigeonholed protection . . . and disaster didn't wait!

In generators, transformers, switching equipment and other utility danger spots fire can strike with crippling effect—with ordinary protection helplessly inadequate. That is why, when CARDOX originated "Low Pressure Carbon Dioxide Systems"* many years ago, the first such system went into a central station. The utility industry has since installed many, many more—as the best and safest protection for millions of dollars worth of equipment. CARDOX CO_2, applied in *any* quantity required, holds fire damage to a minimum—and eliminates extinguishment damage entirely.

Why not ask for a CARDOX Survey and recommendation on your hazards? There's no cost or obligation.

*Covered by Patents Issued & Pending

CARDOX

ORIGINATOR OF **Low Pressure CO_2**

FIRE EXTINGUISHING SYSTEMS

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

Offices in Principal Cities

discussions before company meter testers, members of the commercial department, and residential customer groups.

WATTHOUR METERS and electric bills are explained by Jim Stocks of California Electric Power Co and the board he designed and built to give picture of meter operation

Lamps in the display range from 40 w to 150 w and are controlled by individual switches. They are used to give the audience a visual impression of energy consumption. All load current used by the display passes through the meter at left. The meter next to it registers demand. Double outlet at right is for such loads as irons and heaters.

The combination of the principles of meter operation and the visual evidence of load and demand help the audience understand why the meter disk rotates faster for heavy loads than for light loads. The display is used not to discourage the use of electricity, but to forestall customer complaints because of seemingly high bills.

Empty Old Oil into Sump Below Floor

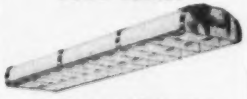
Oil sump under the floor makes the job of emptying transformers and oil circuit breakers an easier one at California Electric Power Co. Old oil is poured directly through steel grates into either of two sumps with a capacity in excess of 750 gal each. The hazard of sump tanks above floor level splashing oil over the floor or tipping and endangering the operator is eliminated. Neither do tanks have to be raised to be emptied, as was the case formerly. Flushing tanks with oil from storage tanks is also easier.

"No Strangle Holds — No Grunts, No Groans"

No husky bruisers are needed on your crew when you work with Pittsburgh Permaflector Lighting Units. All parts fit together easily, quickly, compactly. Fluorescent Units are wired complete, ready to install; knockouts for lead wires and mounting are clearly marked; inline installations can be aligned perfectly. Incandescent Units are simple to assemble into desired arrangements and combinations for every lighting need. Standard Units are available to fit into fluorescent troffer and luminaire assemblies.

Next time—whistle while you work. Use time and labor-saving Pittsburgh Permaflector Lighting Equipment.

The
MONROE 5000 SERIES



4 & 8 FT. FLUORESCENT LUMINAIRES FOR EFFICIENT LIGHTING

ALL YOU MOUNT IS A BARE CHASSIS

Units are mounted by one man. Hangers provide for vertical, lateral and lengthwise adjustment.

"Pittsburgh" Permaflector

Pittsburgh Reflector Company

408 OLIVER BUILDING · PITTSBURGH 22, PENNSYLVANIA

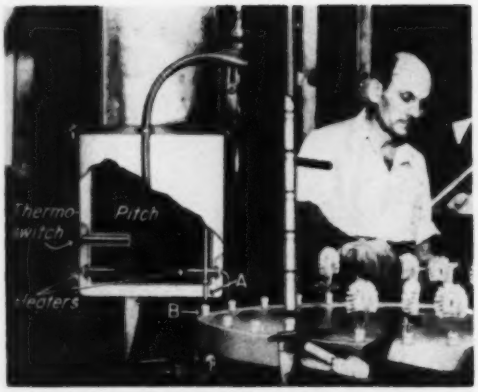
Manufacturers of Fluorescent and Incandescent Lighting Equipment

INDUSTRIAL APPLICATIONS

Thermostatic Control Prevents Damage from Solidified Pitch

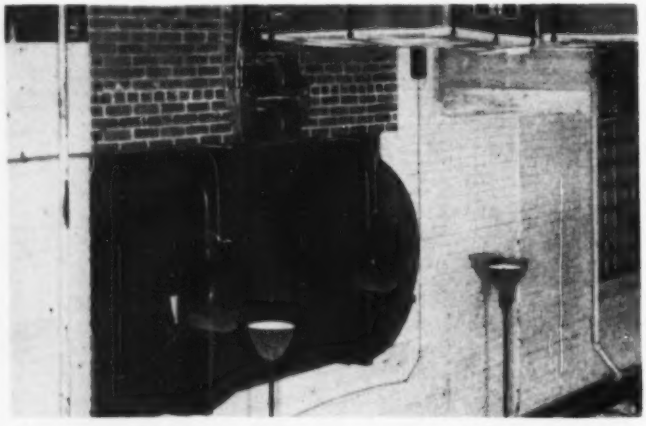
A thermostatic control switch inserted into a thermal well in the side of a pitch tank keeps open the power circuit for an automatic pitch-pouring machine until melting-point temperature of the pitch is reached. Because of this arrangement, the machine cannot operate until the pitch becomes fluid, thereby preventing possible damage to the spigot linkage and electric motor that control the flow of the pitch.

The pitch compound is used to seal brush heads into their handles at the Fuller Brush Co of Hartford, Conn. As the accompanying illustration shows, the pitch is poured from an electrically heated tank through the spigot (A) into the open end of the brush handle (B) as the handle stops beneath the spigot. The spigot is operated by an electrically powered rod linkage which, controlled by cam action, releases the proper quantity of pitch into the handle. The spigot linkage also controls the rotating table, so that the table advances one station each time a handle is filled. The handle, located in a rotary table, moves around past the operator who inserts the brush head. The assembled brushes are ejected from the table as the table completes its rotation and are replaced by new handles from the continuous-feeding chute.



THERMOSTATIC CONTROL SWITCH keeps motor circuit open till pitch is in fluid condition. Melted pitch flows through spigot (A) into handle (B) for brush assembly

Because the protective control known as a Thermo-switch is in close contact with the pitch, it can quickly sense whether the sealing compound has reached its fluid temperature. Depending on the temperature, the thermostat contacts either remain open or become closed and, accordingly, prevent or permit operation of the power circuit. Sensitivity of the thermostatic unit, plus or minus 0.1F, provides rapid response in the circuit.



Electric Fans Solve Heat Problem

L. ALBERTSON, Application Engineer

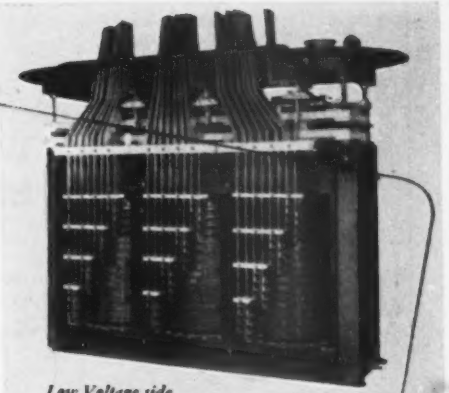
Two 36-in. and two 48-in. electric fans enable the Legal Intelligencer, publishing and printing firm, Philadelphia, to completely change the air in its 325,000 cu ft plant in as little as 5 min. Cool outdoor air is drawn through open windows and across the press room and exhausted with excess heat from gas burners on presses and fumes from lead pots on linotype machines.

In the summertime, when the heat in the one-story plant would otherwise be intensified, the fans sweep fresh air across the entire plant and keep the atmosphere cool and pleasant.

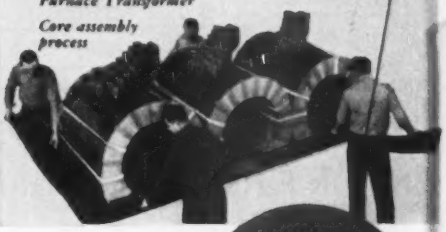
Preheating Enameled Parts Saves Space

Preheating small parts with infrared radiant heaters prior to oven baking vitreous enamel on them, eliminated air drying racks and saved valuable floor space at Metal Arts Co, Rochester, N. Y. A 31-kw oven was installed for baking the vitreous enamel on small parts. The moisture in the enamel would boil out too rapidly—spoiling the surface finish. In order to prevent this rapid boiling, they found it necessary to air dry the enamel before baking in the oven. Racks and racks of enameled parts air drying took up valuable floor space in the plant. Five 1800-w infrared radiant heaters were connected together to form a semi-circle or tunnel over the feed end of the conveyor which runs through the enameling oven. These heaters preheat the parts entering the oven enough to drive the moisture out of the enamel before the parts enter the intense heat of the oven proper, thus preserving the surface finish of the parts. D. A. Sweetland, Eng, Comm & Ind Sales Dept., Rochester Gas & Electric Corp.

How Pennsylvania solves 3 major Furnace Transformer Problems



Low Voltage side of 18,000 Kva Furnace Transformer



Core assembly process

The complicated design of a furnace transformer presents many problems that do not apply to other types of transformers. Many special conditions such as overloads, short circuit stresses, distribution of currents and reduction of eddy losses must be met by engineering skill and highly perfected workmanship. Here is how Pennsylvania Transformer Company solves three of these major problems:

1 **OVERLOADS AND SHORT CIRCUIT STRESSES** Electric Furnace operation inherently subjects Furnace Transformers to frequent short circuits and heavy overloads. The effect of this on the transformer is complicated by the wide range of voltages which necessitates cutting out large portions of the primary windings. The effects of both the radial and axial short circuit forces are greatly reduced in Pennsylvania Furnace Transformers by the use of Circular Coils and an ingenious winding arrangement.

2 **BALANCING OF STRESSES** Pennsylvania coils are balanced to reduce the radial and axial short circuit stresses to a minimum. 1. The circular shape protects the coils against deformation due to radial short circuit forces. 2. The total axial short circuit force is calculated for each design and the coils are subjected to an equivalent pressure in an hydraulic press. The ability of the coils to maintain their shape, under the prescribed pressure, guarantees that the transformer will safely withstand short circuits.

3 **DISTRIBUTION OF CURRENTS** Due to the heavy secondary currents, the winding must be subdivided into numerous parallel sections. A unique arrangement of the windings insures that each section carries an equal share of the current.

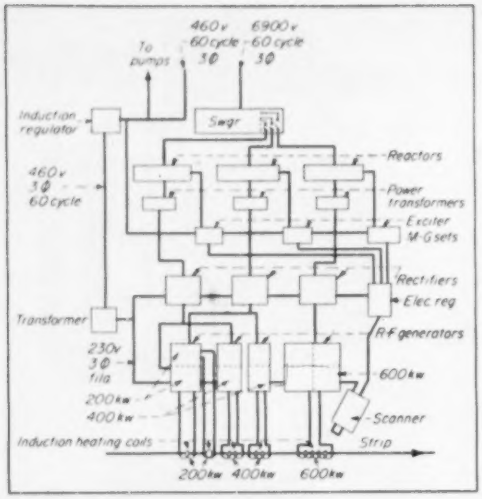
Careful transposition of the individual conductors of each section in the windings reduces the copper eddy losses to a minimum. This results in improved efficiency, more uniform copper temperature and prevention of hot spots.

Furnace Transformer Experts

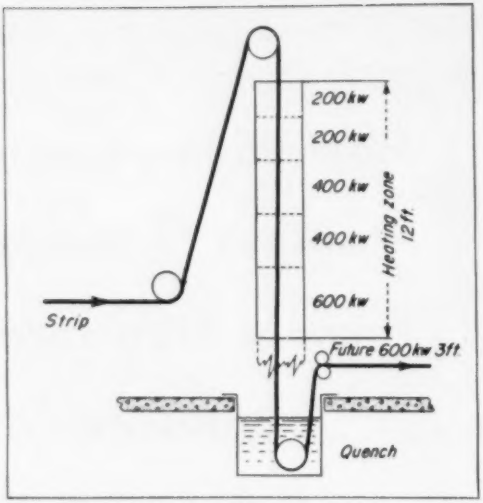
Pennsylvania TRANSFORMERS

Pennsylvania TRANSFORMER COMPANY

CANONSBURG, PENNSYLVANIA *Greater Pittsburgh District*



TIN REFLOW functional diagram showing main 6900-v main power service and 460-v auxiliary service for circulating pumps for coolants and exciter M-G sets supplying d-c to reactors.



COIL ARRANGEMENT for 1800-kw, 175-kc tin fusion equipment. Strip is heated without any physical contact with the heater coil assembly. This avoids damage to the finish of the strip.

New R-F Heat Setup Plates Tin 10% Faster

A. P. BOCK, Advisory Engineer, Electronics Div., Westinghouse Electric Corp., Baltimore, Md.

A new tinning line was placed in service late in 1951 by Jones & Laughlin Steel Corp at its Aliquippa, Pa. plant. It produces tin plate at a nominal speed of 2000 ft per min—more than 10% faster than previous lines. To provide the desired surface, 1800 kw of radio frequency generators are required.

The electrical drive equipment for this line is spectacular in its requirements. The adjustable-voltage drive system for this electrolytic tinning line, with a maximum speed of 2000 fpm, consists of 134 d-c drive motors totaling 1450 hp and ranging in size from 2 to 200 hp. The control boards for the line are some of the longest industrial process units. The 134 drive motors must function as a unit during starting, stopping, and as the speed changes over a range of approximately 10 to 1.

Power enters the tin flow apparatus at 6900-v, 60-cycle, 3-phase, as shown on the accompanying diagram. Through three isolation disconnects, it then enters the three power transformers through saturable reactors. Rectifiers convert high-voltage a-c to high voltage d-c. Two of the rectifiers each feed a 400 and a 200-kw radio-frequency generator. The third rectifier feeds a single 600-kw generator. The five induction heating coils are fed from the 200, 400, and 600-kw generators.

Auxiliary power at 460-v, 60 cycle, three phase supplies circulating pumps for coolants. This auxiliary power also supplies the exciter motor-generator sets which supply d-c current for saturation of the large reactors. The 460-v auxiliary power supply is also reduced to 230-v and automatically regulated to supply filament power for the oscillator and rectifier tubes.

Flow line position regulator furnishes a signal to the electronic regulator, which in turn regulates the fields of the exciter generators, thereby controlling the degree of saturation of the reactors which are in series with the primary power circuits. The result is that the temperature of the moving strip is held substantially constant despite variations of strip speeds, strip widths, strip thickness, surface moisture, and despite variations in the line voltage supply.

INDUSTRIAL BRIEFS

Wax Melting is accurately and safely controlled at H. H. Robertson Co, Ambridge, Pa., by 126 kw in strip heaters clamped to outside of 600-gal kettle. Additional 10 kw of strip heaters on draw-cocks and release valves of tank assure easy flow of wax compound into containers. Kettle heaters are connected to provide three horizontal zones of control temperature which permits economical operation. E. M. Wenner, Industrial Power Engineer, Duquesne Light Co, Pittsburgh, Pa.

Valve heating with electric strip heaters eliminates costly maintenance and improves production schedule at the Harrison Paint and Varnish Co, Canton, O. During operations of 1000 gal Alkyd resin kettle, vapors of phthalic anhydride condensed on the seat of the 8 in. gate valve preventing proper closing. Frequent removal and cleaning of the valve was necessary which greatly increased cost of operation. Installation of 7.2 kw of strip heaters, thermostatically controlled, to gate valve body and adjacent pipe eliminated condensation of vapors and need of costly maintenance. G. W. Craiglow, Ind Power Eng, Ohio Power Co, Canton, O.

Super Service PLUS PERFORMANCE call for Jacketing of...

Vinylite GRAND PLASTICS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

GET AN EXTRA MEASURE of efficiency from control cable—specify jacketing of VINYLITE Brand Plastic over polyethylene cores! These amazing materials are on the job right now . . . proving their superiority in almost every major field. In municipal signaling systems, on railroads, in chemical plants, they are doing their part to impart quality, cut costs and lower maintenance.

Some VINYLITE Plastic compounds are specially formulated to remain flexible and easy to handle down to −67° F. Both VINYLITE Plastics and polyethylene make possible smaller over-all diameters for a given gauge . . . thus reducing expense. Easy to strip and splice, they speed installation. VINYLITE Plastics and BAKELITE polyethylene are outstanding in retaining electrical properties under severe environmental conditions. They stand up under water immersion or ground burial.

Now is the time to put wire and cable insulated with VINYLITE Jacketing Plastics over polyethylene cores to work for your operation—whether military or civilian. Write for a representative list of suppliers. Address Department MU-28.

Memo to Wire Manufacturers

Producing wire that will stand up to chemical plant conditions is a difficult engineering problem. Learn about the latest advances in this field. Send for **Kabelitems No. 84,** entitled "Plastic Insulated Cables for Chemical Plants." It's a mine of information you will want to have. A copy is yours for the asking.

Since the introduction of fluorescent lighting...

greatest STEP UPWARD in industrial SEEING COMFORT

...new BENJAMIN "Task Master"

Shatters precedent with a completely new concept of lighting unit design!

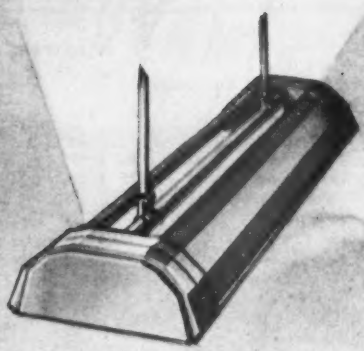
Masters the brightness ratio problem by directing approx. ¼ of light upward!

Doubles... even triples... present standards for industrial seeing comfort!

Introduces new methods of installation and maintenance!

Yes, the new Benjamin "Task Master" is the greatest step UPWARD in industrial fluorescent lighting history. It's a step UPWARD to high lighting levels without the discomfort which can often accompany them... a step UPWARD to complete freedom from annoying ceiling contrast that may cause excessive brightness ratios. It's a step UPWARD to greater seeing comfort in America's work places! Moreover—"Task Master" represents a great step UPWARD in high-speed installation and trouble-free maintenance, as shown above. Get full details about this greatest step UPWARD in industrial seeing comfort... send for FREE "TASK MASTER" Data Bulletin, containing complete specifications. Write:

Benjamin Electric Mfg. Co., Dept. K, Des Plaines, Ill.



3 ways to mount: chain, conduit and sliding hanger suspension (illustrated).

UPWARD ILLUMINATION COMPONENT directs approximately ⅛ of light towards the ceiling. In addition to providing more generous **UPWARD** flow of light, this unique construction reduces maintenance expense as it practically eliminates horizontal areas where dust and dirt can collect.

DETACHABLE REFLECTORS are hinged to facilitate easier, more thorough cleaning right on the fixture; or they may be quickly unhinged and replaced with reflectors which were previously cleaned at a bench. 2 simple spring-type clips lock or release each reflector . . . no tools needed.

PRE-WIRED . . NO WIRE SPLICING . . All Connections made to Terminal block. No need to run line wire through fixture. Furnished with branch circuit wiring already run through a combination spine support and lamp shield. (Shielding angle is 35°) Just connect line wires to terminals (see picture A above). For continuous line installations, simply connect "jumper" wires to opposite terminal blocks (see picture B).

BALLAST AND TERMINAL BLOCK are strategically located in easily-accessible end sections . . . out of the way for more streamlined appearance.

Of course, **EXCLUSIVE BENJAMIN "SPRINGLOX" LAMPHOLDERS** are standard equipment. They are acknowledged as embodying the most advanced lampholder features. Such as: rugged, all-metal construction and unique, patented spring design for "quick-in, quick-out" lamp maintenance.

Midwest Farmers Intend to Buy

Production Equipment

	%	No.
Elevators	7.7	91,861
Electric fences	7.2	85,896
Hog waterers	7.2	85,896
Lights (poultry house)	7.0	83,510
Air compressors	6.1	72,773
Lights (hog house)	5.9	70,387
Water warmers (poultry)	5.8	69,194
Water heaters (dairy)	5.7	68,001
Hog brooders	5.4	64,422
Milking machines	4.8	57,264
Hammer mills	4.7	56,071
Ventilating (poultry house)	4.4	53,685
Lights (dairy barn)	4.4	52,492
Power grinders	4.0	47,720
Wagon unloaders (4-wheel trailer)	3.8	45,334
Poultry brooders	3.7	44,141
Ventilating (dairy barn)	3.7	44,141
Stock tank heaters	3.5	41,755
Milk coolers	3.5	41,755
Cream separators	2.1	25,053
Ventilating (milk house)	2.1	25,053
Feed grinders	2.1	25,053
Wagon unloaders (2-wheel trailer)	2.0	23,860
Corn shellers	1.9	22,667
Ensilage cutters	1.7	20,281
Barn cleaners	1.6	19,088
Ventilating (hog house)	1.5	17,895
Silo unloaders	1.3	15,509
Wagon hoists	1.0	11,930
Crop driers	.7	8,351
Hay driers	.5	5,965
Grain elevating—blowers	.4	4,772
Irrigation pumps	.3	3,579
Roughage mills	.3	3,579

Farm Home

Farm and home freezers	13.4	159,862
Water heaters	10.2	121,686
Food mixers	7.6	90,668
Non-automatic washers	6.6	78,738
Toasters	6.0	71,580
Refrigerators	5.3	63,229
Electric clocks	5.3	63,229
Ranges	4.5	53,685
Clothes driers	4.5	53,685
Waffle irons	4.5	53,685
Home pasteurizers	4.1	48,913
Irons	3.0	35,790
Automatic washers	2.6	31,018
Kitchen fans	2.4	28,632
Portable fans	2.4	28,632
Ironers	2.1	25,053
Roasters	1.2	14,316
Dishwashers	.9	10,737
Food waste disposers	.9	10,737
Space heaters	.6	7,158

General

Motors (less than 1 hp)	7.8	93,054
Pressure water systems	7.5	89,475
Portable drills	7.0	83,519
Wiring (new and additional)	5.5	65,615
Welders	5.0	59,650
Motors (1 hp and larger)	4.6	54,878
Power grinders	4.0	47,720
Portable saws	3.4	40,562
Bench drills	.8	9,544
Space heaters	.6	7,158
Stationary saws	.4	4,772
Metal working lathes	.4	4,772

Midwest Farm Electric Market Explored

Rich potential of the farm electric market is underlined in a new study of buying requirements prepared by the Farm Electrification Bureau of the National Electrical Manufacturers Association. The study, conducted in eight Midwestern states, indicates that farmers are wide open customers for both farm home and farm production equipment.

Accompanying tables show that many of the 1.2 million farms in Illinois, Indiana, Iowa, Minnesota, Nebraska, North Dakota, South Dakota and Wisconsin will be buying home appliances, farm production machines and equipment, and such general use items as motors and water pressure systems in the next few years.

NEMA compiled its information by spot checks with 1,500 farm families in each of the eight states. Based on such samples, potentials for each item were estimated by multiplying the percentage figures by the number of farms in each of the states studied.

It is significant that two home use items, farm and food freezers and water heaters, far outstripped any item on the productive side as possible sales items. It bears out, in part, the supposition that the major buying concentration is still in home use items, and, implicitly, that the farm production possibilities still remain greatly unexploited.

Personalized Approach Sells Electric Water Heaters

H. E. KING & FRED LEWIS, West Penn Power Company

Before World War II, sales of electric water heating equipment to commercial users were practically non-existent, as far as the West Penn Power Co was concerned. Today this phase of its work is responsible for 3% of all new commercial business acquired by the utility.

What was responsible for this growth? West Penn credits it to planned sales coverage of customers. This program, stepped up since 1949, has included a broad general survey of the field, surveys of customers' needs, increased individual attention, and streamlined direct mail promotion.

Combined, these factors have been responsible for doubling West Penn's water heating sales to commercial users since 1950, with prospects ripe for continued growth. Spur for the new drive was Harry Restofski, West Penn's vice president, at whose urging a broad survey of the commercial market was undertaken in 1949.

Over 1,200 customers in all business classifications were surveyed by sales representatives. Detailed information was obtained on present water heating equipment, hot water uses, and customer interest in electric heating. The most striking discovery: One out of every five surveyed was a prospective buyer during the succeeding two years.

Acting on this prospect, West Penn representatives went out to bring in $26,500 in new revenue on water heating equipment during 1950 and 1951. This compares with an average of under $6,000 in new revenue for

(*Continued on page* 168)

YOU GET 4 EXCLUSIVE ADVANTAGES WHEN YOU SPECIFY

FLEUR·O·LIER

1 Only Fleur-O-Lier fixtures are rated on the Fleur-O-Lier Index Rating System. This gives illuminating characteristics, shielding, brightness, etc., for each fixture.

2 Complete photometric test data including distribution curves and coefficients of utilization tables are computed by Electrical Testing Laboratories, Inc., and are provided for every Fleur-O-Lier luminaire.

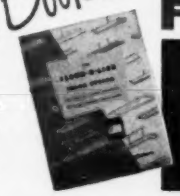
3 Fleur-O-Lier fixtures are *certified* by Electrical Testing Laboratories, Inc., as complying with rigid specifications covering electrical and mechanical construction.

4 More than 300 different Fleur-O-Lier fixtures made by nearly 30 manufacturers give you a wide selection from which to choose.

THESE 4 ADVANTAGES ASSURE *Lighting Satisfaction* WHEN YOU SPECIFY FLEUR-O-LIER

Free Booklet

Write for your free copy of the new booklet giving complete details of the Fleur-O-Lier Index System.



FLEUR·O·LIER

Manufacturers

2116 Keith Building • Cleveland 15, Ohio

Fleur-O-Lier is not the name of an individual manufacturer, but of a group of fixtures made by leading manufacturers. Participation in the Fleur-O-Lier program . . . open to any manufacturer who complies with the Fleur-O-Lier requirements.

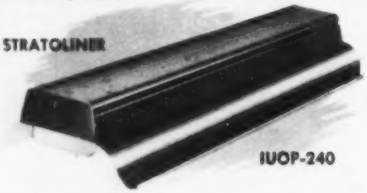
DEPEND ON Leader

for the

- newest in design
- finest in construction
- most complete selection

The Leader line of fine lighting fixtures is constantly being expanded to meet new needs in industry, business and a wide variety of other fields. Leader fixtures . . . whether they are long-established favorites or sparkling newcomers . . . offer the latest in styling, precision engineering, and finest quality construction, together with outstanding ease of installation and servicing. Electrical contractors everywhere know they can depend on Leader to furnish the *right* light for every need.

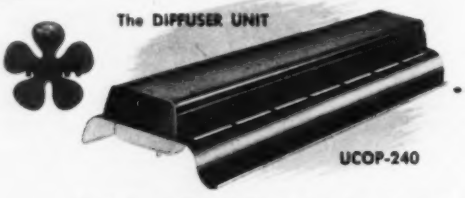
The STRATOLINER



IUOP-240

Leader's STRATOLINER offers everything desired in a heavy-duty, all-steel industrial fluorescent fixture. Durable, strongly built, neat in appearance, easily serviced. Models for 2, 3 or 4 40-watt lamps or 2 85-watt lamps, in open or closed end styles. Choice of high-gloss baked enamel or porcelain enamel reflectors (RLM approved.)

The DIFFUSER UNIT



UCOP-240

Leader's new DIFFUSER unit has the same sturdy construction as the "Stratoliner," except that the DIFFUSER provides a 7% indirect lighting component. This is desirable in many industrial installations, to modify the contrast between brightly lighted work areas and dark upper areas. Available for 2 or 3 40-watt lamps in open end style. Reflector in choice of high-gloss baked enamel or porcelain enamel.

A wide variety of other industrial fluorescent fixtures are available, including Slimline models for 2, 3 or 4 lamps in 72″ or 96″ length.

Type ISD—Standard Dome

Type ISA—Symmetrical Angle

Type IDB—Deep Bowl

Type IEA—Elliptical Angle

Type IGS—Glass-Steel Diffuser

Type IHB—High Bay Unit

LEADER INCANDESCENT UNITS

New Leader incandescent units are available in a number of styles, for use with 150 to 500 watt lamps..

Type ISD—*Standard Dome*—best for general lighting where both horizontal and vertical surfaces are to be lighted, such as workbenches, assembly lines, etc.

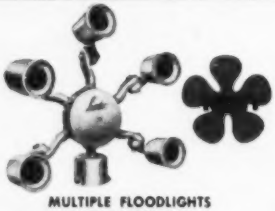
Type IDB—*Deep Bowl*—ideal for machine shops, shipping or receiving departments, assembly lines, print shops.

Type IGS—*Glass-Steel Diffuser*—for use wherever softer light without sharp reflections is desired. Globe of smooth finish, high grade opal glass.

Type ISA—*Symmetrical Angle*—to supplement general lighting or for extra illumination on vertical surfaces.

Type IEA—*Elliptical Angle*—for wide angle horizontal and vertical illumination.

Type IHB—*High Bay Unit*—for higher mounting heights, such as in warehouse aisles, foundries, etc.

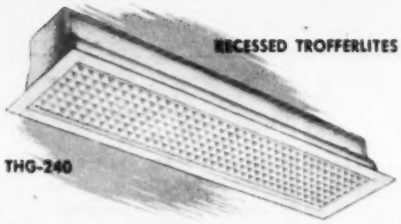


MULTIPLE FLOODLIGHTS CL-700 ASSEMBLY

For service station and parking lot lighting, outdoor displays, industrial protective floodlighting, home sports area lighting, etc., Leader multiple floodlights are efficient and flexible. 2 to 5 floodlights fit cast aluminum junction box, mounted on pole fitter. Special silicone gasket for long life and dependable all-weather performance. For 300 or 500 watt lamps.

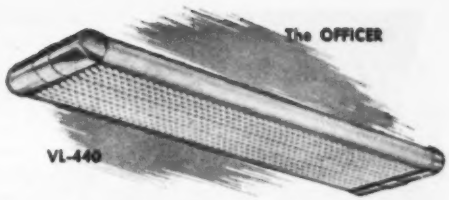
May be used with STATION MASTER, at right.

Leader America's No. 1 Lighting Equipment Manufacturer



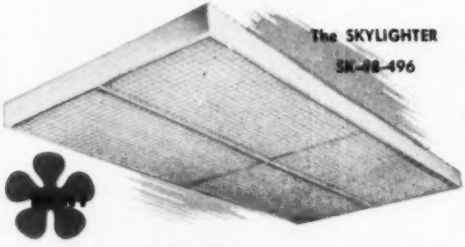
Leader TROFFERLITES furnish an exceptionally fine system of fluorescent lighting, whether used singly or in continuous rows. Available in louvered, open, baffled or glass enclosed styles (or with various types of specialized lenses including Leader's new plastic lens*, flat or curved Holophane Controlens†, etc.) Complete range of lengths, from 24" to 96", in 12" or 24" width, in regular (7⅛") or shallow (6") depth, for from 1 to 8 lamps.

*Pat. Pend. †Copr. The Holophane Co.



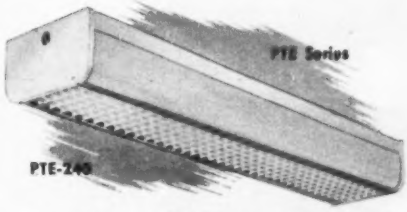
America's finest fluorescent fixture! Leader's OFFICER provides distinctive lighting for offices, stores, banks, schools, libraries. Steel channel, deep drawn end caps, side panels in choice of steel or translucent plastic. Plastic louver** in choice of 45° or 31° shielding angle. Swings down from left or right for maximum ease of servicing. Available for 2, 3 or 4 lamps, either 40-watt or Slimline in 48", 72" or 96" length. May be mounted singly or in continuous rows, either direct to ceiling or suspended.

**Made under Pat. No. 2566817



Leader's new SKYLIGHTER is the answer to the demand for more light and better light. These distinctive new surface mounted fixtures provide floods of glareless light. May be used singly, or mounted end to end or side by side, to form a variety of striking illumination patterns, or to provide a complete ceiling of light. 40° x 40° plastic louver** or choice of various types of plastic diffusion inserts. Available in sizes from 2′ x 2′ to 4′ x 8′.

**Made under Pat. No. 2566817



Outstanding for store lighting! Leader's PTE Series has been expressly designed to provide economical and efficient store lighting. Installation of these fixtures enhances the appearance of displays and counters and makes store interiors more inviting and attractive to customers. Side panels in choice of ribbed Albalite glass or translucent plastic; bottom panel in choice of flat Albalite glass, plastic lens*, or plastic louver** with 40° x 40° shielding. For 2, 3 or 4 lamps, either 40-watt or Slimline in 48", 72" or 96" length.

*Pat. Pend. **Made under Pat. No. 2566817

The STATION MASTER

Leader's STATION MASTER, for service station island lighting, delivers high intensity of light without glare. Puts light where it is needed – where the sale is made and service rendered. Rugged weather-proof construction throughout. Available in lengths from 4 ft. to 20 ft., with continuous one-piece channel. Sliding pole fitter adjustable to any pole spacing.

Provision for floodlight mounting 4" from each end and in center of fixture. Use multiple lights, shown at left, or single floodlight.

Sold and installed by the better electrical wholesalers and contractors

Leader

LEADER ELECTRIC COMPANY

3500 North Kedzie Avenue • Chicago 18, Illinois

Leader Electric–Western: 800 One Hundredth Avenue, Oakland 3, California
Campbell-Leader, Ltd.: Brantford, Ontario, Canada

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power

QUICKLY Installed

TOUGH For long life

● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE
EVERSTICK
FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.

Manufacturer of "THE ANCHOR OF MERIT"

FAIRFIELD, IOWA

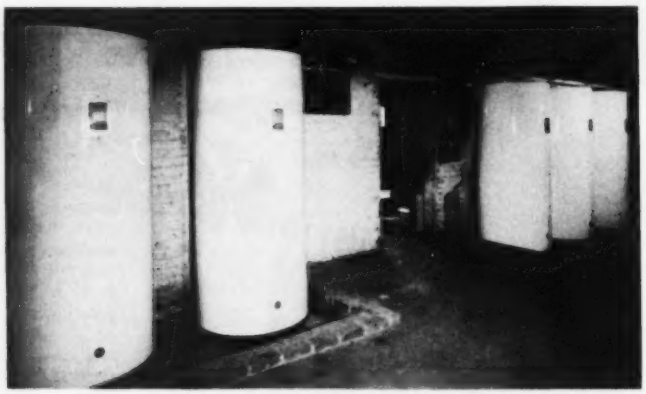
(*Continued from page* 164)

WATER HEATING SURVEY

1. CUSTOMER
2. CLASSIFICATION
3. ADDRESS
4. HOT WATER SERVICE: Yes ☐ No. ☐
5. IS IT ADEQUATE? Yes ☐ No. ☐
6. METHOD OF HEATING:
   Electric ☐ Natural Gas ☐
   L. P. Gas ☐ Other ☐
7. TYPE OF EQUIPMENT: Non-Automatic Storage ☐
   Automatic Storage ☐ Instantaneous ☐
8. EQUIPMENT RATING:
   Capacity ..... gals.
   Recovery ..... gals./hr. for ..... °F. rise
9. AGE OF EQUIPMENT ..... years
10. CONDITION OF EQUIPMENT:
    Good ☐ Fair ☐ Bad ☐
11. HOT WATER USES:
    No. of Basins: Public ..... Private .....
    No. of Bathtubs: .....
    No. of Showers: .....
    No. of Dishwashers: .....
    No. of Kitchen Sinks: .....
    No. of Utility Sinks: .....
    Laundry Uses: .....
    Other Uses: .....
12. HOURS OF OPERATION OF ESTABLISHMENT:
    From ..... To .....
13. AVERAGE MONTHLY WATER CONSUMPTION:
    ..... gals.
14. ESTIMATED DAILY HOT WATER REQUIREMENTS:
    ..... gals.
15. PERIOD OF MAXIMUM USE:
    From ..... To .....
    Ratio of peak period use to total daily use
    ..... %
16. PROSPECT FOR ELECTRIC WATER HEATING:
    No ☐
    Yes ☐ Now ☐ Within 2 years ☐
    Central Heating ☐ Sup. Heating ☐
17. ELECTRIC WATER HEATING EQUIPMENT RECOMMENDED: .....
18. TYPE OF SERVICE RECOMMENDED:
    Off-Peak ☐ Continuous ☐
19. REMARKS: .....

Signed .....

USING ANSWERS to a survey sheet such as this, West Penn recommended and installed. . .



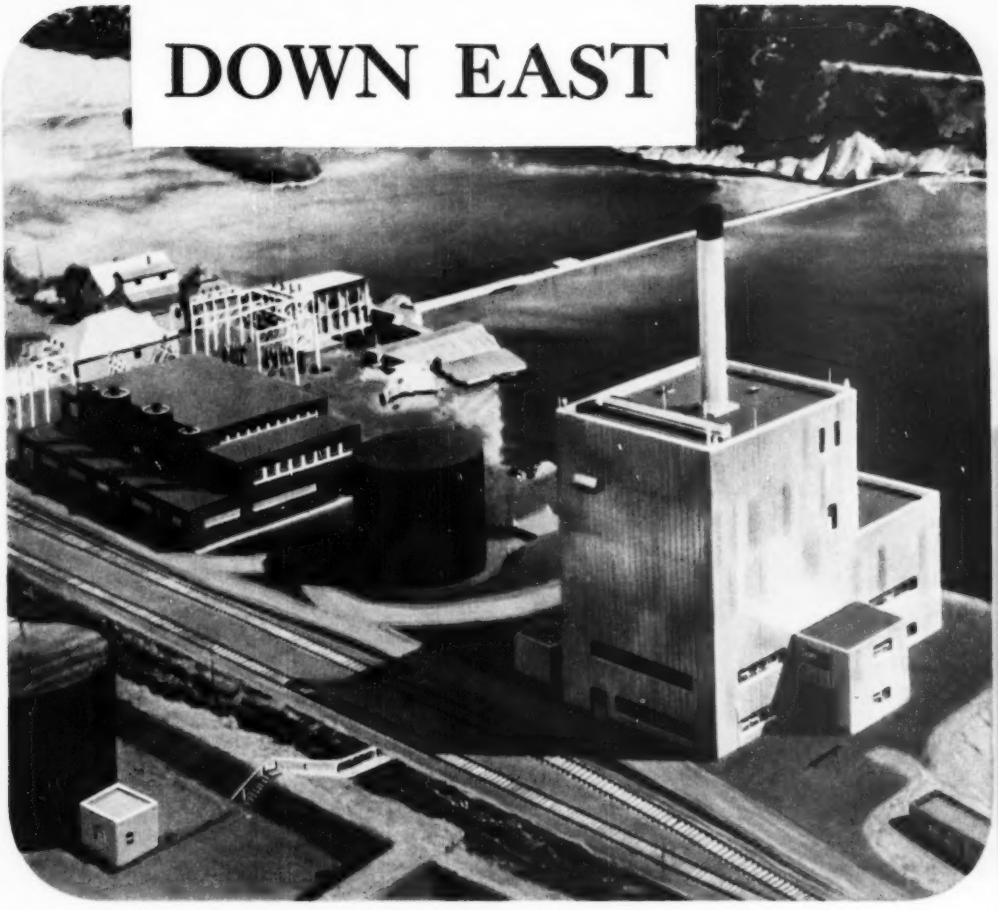
. . .THIS BANK of five electric water heaters piped in parallel in the Mountain View Hotel near Greensburg, Pa., which provides 150-degree water throughout the building

the four preceding postwar years. Even greater things are expected for this year, since prospects for $12,700 in water heating new business were obtained in a short but hard-hitting program conducted from Feb. 15 to March 31.

West Penn's sales people have been trained to approach each water heating

(*Continued on page* 171)

DOWN EAST



Caribou Steam Power Station of the Maine Public Service Company in Caribou, Maine. Normal capacity: 7500 kw. Top continuous load limit: 9000 kw.

This plant is a typical example of Stone & Webster Engineering Corporation's current work in the design and construction of smaller plants for power purposes.

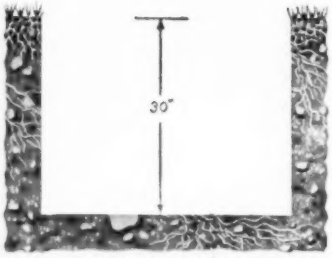
Our services are available for power projects both large and small.

STONE & WEBSTER ENGINEERING CORPORATION

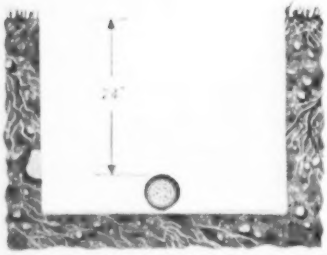
A SUBSIDIARY *of* STONE & WEBSTER, INC.

How to install buried cables in trenches

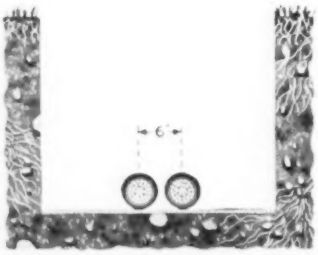
The most generally satisfactory way of installing buried cables is to lay them in a trench on a cushion of sand. There is less bending, distortion or tension than when a cable plow is used, a valuable factor if strains later occur through earth settling. The cable can also be protected by a treated plank or slab of concrete laid over it. Trenching permits the installation of cables at generally greater depths than does plowing. This greater depth makes cables less subject to damage by insects or rodents.



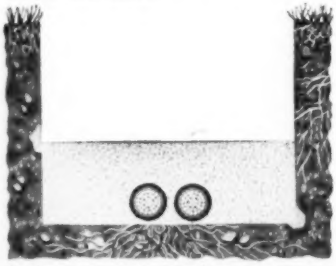
1. The trench should be deep enough (about 30") so that the cable, after providing the cushion mentioned below, will be at least 24" below the surface. This reduces the possibility of mechanical damage.



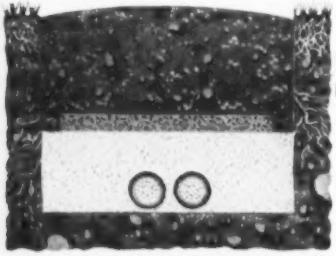
2. Put a cushion of sand on the bottom of the trench, or at least make sure the bottom is free of stones and other harmful debris. Lay cable with a slight snaking, to allow for earth settling and for expansion and contraction during load cycling.



3. When two or more cables are installed in the same trench, they should be spaced uniformly about 6" between centers so that the sand or earth can fill in around them. There must be no criss-crossing.



4. Cover the cable or cables to a depth of about 6" with sand or soft earth free from stones so that no rough edges will press against them.



5. Lay a concrete slab or creosote-treated plank on the sand or soft earth refill, to protect the cable and warn workmen of its presence. Complete the refill. Under highways, streets and rights-of-way, cables should always be installed in conduit.

Because of today's scarcity of rubber and copper, great care should be taken to see that your installations last as long as possible. With a few simple precautions, you can extend the life of your cables under normal operation. Although these precautions are well-known to many, we repeat them in the interest of getting maximum efficiency and long life out of our material and resources.

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

Electrical Wire and Cable Department

ROCKEFELLER CENTER • NEW YORK 20, NEW YORK

(*Continued from page* 168)

application as an individual problem. Consideration is given to daily hot water requirements, peak periods of hot water use, space available, equipment required for off-peak and continuous service, operating and equipment costs, and wiring requirements.

They have found that greater safety, reliability, flexibility of location, and low maintenance costs all are factors which influence water heating buyers. They have also found:

1. The great majority of installations consist of one or more electric storage heaters of the type sold to residential customers, with the 80-gallon heater being most popular.

2. While food service establishments and groceries have been the best customers, all commercial users are interested in electric heating.

3. Potential annual business is $1 million, or about one-seventh of present commercial revenues.

Among major installations sold by West Penn are those at the Mountain View Hotel, near Greensburg, Pa, and at Pike Run County Club at Donegal. At the former, five 150-gallon heaters, operated on an off-peak basis, supply 150-degree water throughout the hotel. At Pike Run eight 80-gallon heaters serve the clubhouse, three being piped together to serve the kitchen, and the other five operated individually to serve bath and shower facilities in guest rooms.

Gift Campaign Outlined For Fall-Christmas

Details of the 1952 fall-Christmas phase of the electric housewares gift campaign were approved by the electric housewares section of the National Electric Manufacturers Association at a midyear meeting in Atlantic City. Dealer kit for the coming Christmas season will consist of a comprehensive sales planner, which will contain suggestions for window displays, newspaper ads, traffic pullers, gift wrappings and gift certificates, and a check list.

In its report on the progress of the gift campaign for the first half of 1952, the sales promotion committee stressed the greatly increased local level participation on the part of electric light and power companies, electrical leagues, dealers, distributors, area committees, and others concerned with the sale of electric housewares.

leading photoelectric control

FOR STREET LIGHTING

The F-P Series 63300B Control is the latest unit in a proven line of photoelectric controls for street lighting that have been operating successfully on lighting circuits for over seven years. Today there are more than 35,000 F-P Controls in use by over 700 utilities.

Fisher-Pierce has maintained leadership in photoelectric street lighting control through:

PERFORMANCE — F-P Controls provide street lighting safety because lights are on *when needed*, regardless of time of day. Because the control is photoelectric, it depends only on natural light values for operation. There is no mechanical device to get out of phase with actual daylight conditions.

ENGINEERING — The F-P Series 63300B circuit and technical operating features are the result of years of field experience. The development work and testing was performed in conjunction with utility engineers. The Fisher-Pierce organization is in a position to help utilities in planning, installing and maintaining control systems.

ECONOMY — F-P Controls provide true economy: purchase price and cost of installation are low. Maintenance is practically negligible as compared to other control methods. To give you a picture of this F-P economy, we will be glad to refer you to some of our customers who have had extensive field experience with these controls.

Write for Bulletin 63300B.

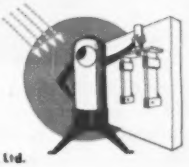
FP

The FISHER-PIERCE CO., Inc.

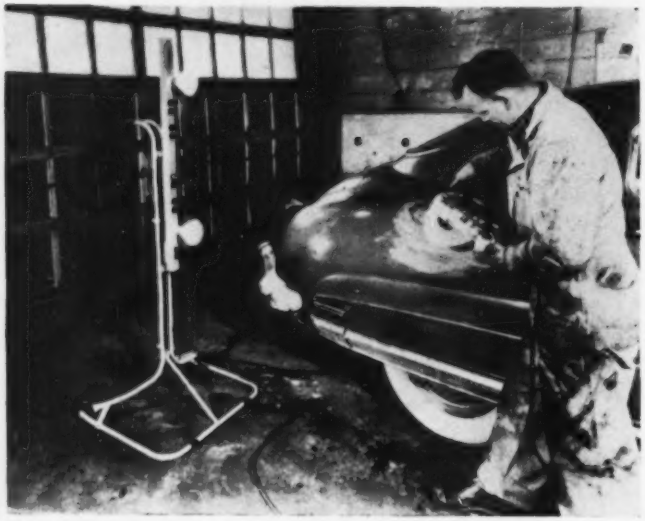
82 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.



NEW EQUIPMENT



Portable Power Unit

Supplying both light and power, the portable Rolla-Duct is furnished with a circuit breaker, 21 ft of cable, flood lighting or infrared heating strips. It is collapsible for close-to-floor work or for movement. The unit is grounded and has a rating for 20 amp loads at 115-v operation.

National Electric Products Corp, Chamber of Commerce Bldg, Pittsburgh 19, Pa.

Transformer Bushing

A high-voltage transformer bushing with simplified construction has been developed for the purpose of minimizing porcelain breakage.

The new bushing is designated Type LC. The possibility of porcelain breakage is lessened by the use of pressure clamping.

Reduced in size and weight, the bushing reportedly will decrease the height of power transformers from one to five inches. It is liquid-filled and completely sealed to prevent internal corona discharges under high voltage stress.

The Type LC bushing is designed for large power transformers in the 15 and 25-kv class, all power and distribution transformers in the 34.5, 46 and 69-kv class, and oil circuit breakers in the 25-kv and 46-kv class.

General Electric Co, Schenectady 5, N. Y.

Phase Sequence Relay

This phase sequence relay is said to offer positive phase protection to polyphase rotating machinery, protecting against reverse phase sequence, low voltage or single-phase voltage.

The relay is built for continuous service and consumes 5 w per phase. It will operate on 2 or 3 phase ac, at ordinary voltages and frequencies.

Shepard Elevator Co, 5000 Brotherton Road, Cincinnati 9, Ohio.

Oscillograph

A wide-band high-gain oscillograph for pulse study is equipped for quantitative measurement of both time and amplitude. Nominal bandwidth 10 Mc, transient response 0.033 microsec, sweep variable 0.1 sec to 2 microsec. All sweeps may be expanded to 6 times full-screen diameter.

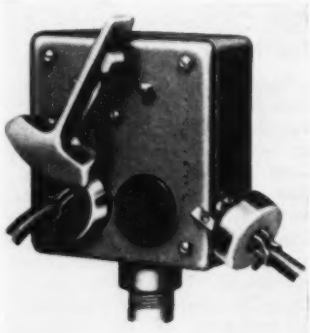
Allen B. Dumont Laboratories Inc, 1500 Main Ave, Clifton, N. J.

Staple Puller

A lineman's staple puller designed for safety and positive action is said to hold staples after release so that they do not fly towards the operator. The device features a telescoping handle for greater leverage, and a curved

foot with a ridged face. It is made of drop-forged steel, heat treated for hardness.

Hammer Blow Tool Co, Wauson, Wis.



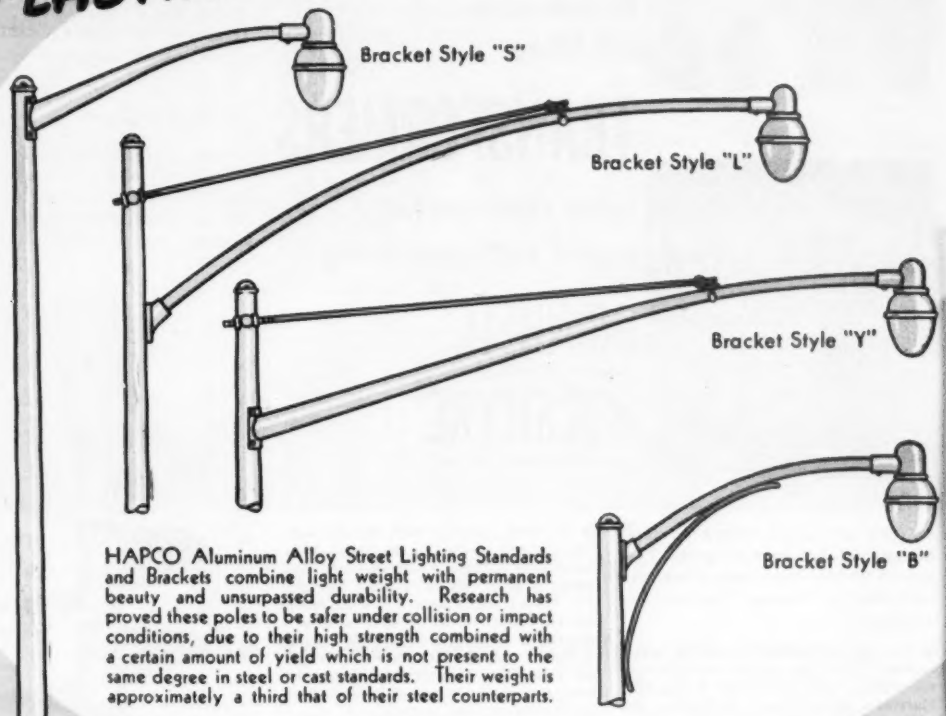
Interlock receptacle

For use with cord sets in hazardous locations, this receptacle contains a sealed mercury switch which deenergizes each socket before plug is inserted or removed, which is said to eliminate sparking.

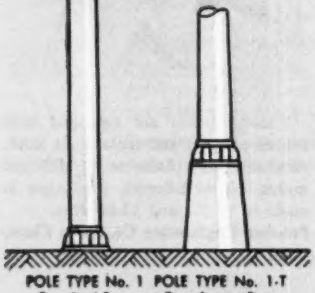
The mercury switch works on a

HAPCO Aluminum Alloy Street Lighting Standards

for LASTING BEAUTY



HAPCO Aluminum Alloy Street Lighting Standards and Brackets combine light weight with permanent beauty and unsurpassed durability. Research has proved these poles to be safer under collision or impact conditions, due to their high strength combined with a certain amount of yield which is not present to the same degree in steel or cast standards. Their weight is approximately a third that of their steel counterparts.



POLE TYPE No. 1 Standard Base — POLE TYPE No. 1-T Transformer Base

- Pole heights from 20 to 35-feet.
- Pole diameters, 8-inches or under, tapering to 4-inches.
- All poles are seamless and jointless.
- Tapering is produced from a single tube by a special process.
- Hand holes furnished extra on request on Type No. 1 Poles.
- Brackets are seamless, jointless and may be either tapered or uniform in diameter.
- Bracket lengths from 3-feet.
- Special bracket styles to your specifications.

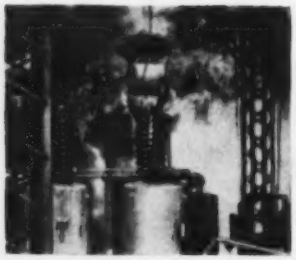
Write for either or both of these Catalogs . . .
"Hapco Aluminum Alloy Street Lighting Standards and Poles"
and "Hapco Street Lighting Brackets and Mast Arms."

HUBBARD ALUMINUM PRODUCTS COMPANY

MANUFACTURER OF HAPCO QUALITY ALUMINUM PRODUCTS

A Division of HUBBARD and COMPANY

6301 Butler Street • Pittsburgh 1, Pa.



PROTECTING

flammable, oil-filled

TRANSFORMERS

with time-tested, rapid extinguishing

GRINNELL MULSIFYRE

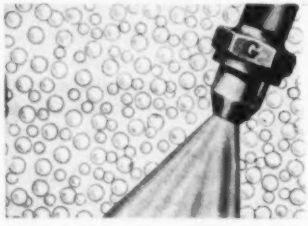
In case after case, where Grinnell MULSIFYRE has been on guard, hazardous oil fires have been effectively controlled — damage limited. For example . . .

● On August 2, 1944, a fault occurred on the 26 KV ring bus at a substation of the Public Service Electric & Gas Co., Harrison, New Jersey. Following the tripout, the operator noticed the end bay, where the transformer was located, to be ablaze. He immediately activated the electrical control operating the Grinnell MULSIFYRE System, deluging the transformer banks with water spray and extinguishing the fire.

● At a substation of the Omaha Public Power District, Omaha, Nebraska, two 25-year-old three phase 6250 KVA 13.2-2.3 KV water-cooled indoor type transformers were protected by a MULSIFYRE System automatically actuated by Quartzoid Pilot Sprinklers. On August 30, 1944 a minor explosion occurred, setting the transformer afire. The Grinnell MULSIFYRE System went into operation immediately, and there was no fire damage.

● In 1948, a lightly built wooden sawing shed was erected by the Singer Manufacturing Company, Bridgeport, Connecticut, adjacent to a bank of three 500 KVA transformers. A fire started in the shed, apparently when a carelessly discarded cigarette or match ignited sawdust, and quickly burned through the roof. The MULSIFYRE System operated over the exposed transformers, preventing damage to them.

Stop future trouble and expense. Get complete facts *now* on reliable Grinnell emulsion-forming spray systems. Write Grinnell Company, Inc., Providence, R. I. Branch offices in principal cities.



GRINNELL *Mulsifyre*

EMULSION-EXTINGUISHMENT OF OIL FIRES

cam lever which locks the cord set caps after they are inserted, completing the circuit. Available with standard, single or double receptacles, ratings are 115v20a or 250v10a. They are furnished for single 3-wire, duplex 3-wire, dual 3-wire, single 4-wire or dual 4-wire service.
Tigerman Engineering Co, 4332 North Western Ave, Chicago, Ill.

Anchor Augers

Using a 3-flight single helix to carry the dirt out and a small-size center shaft which allows rocks to be brought out, this auger is intended for use in hardpan, frozen ground, etc.

Cutting heads are equipped with fishtail pilot bit and replaceable teeth. Available with hubs to fit different makes of earth-borers, the auger is made in 9, 11, and 13-in sizes.
Petersen Engineering Co, Santa Clara, Calif.

"Lint-Tight" Starter

A "lint-tight" loom motor starter features a sheet-steel enclosure, with a neoprene gasket and a flush handle to reduce accidental operation.. The starter provides overload protection

Sangamo J Meters

preferred by men who work with meters

Your meter superintendent and his men prefer meters that can be quickly and easily calibrated, saving costly man-hours for his company.

Men who work with meters *know*, that Sangamo J Meters, as received, seldom need any calibration to meet all generally accepted standards of accuracy.

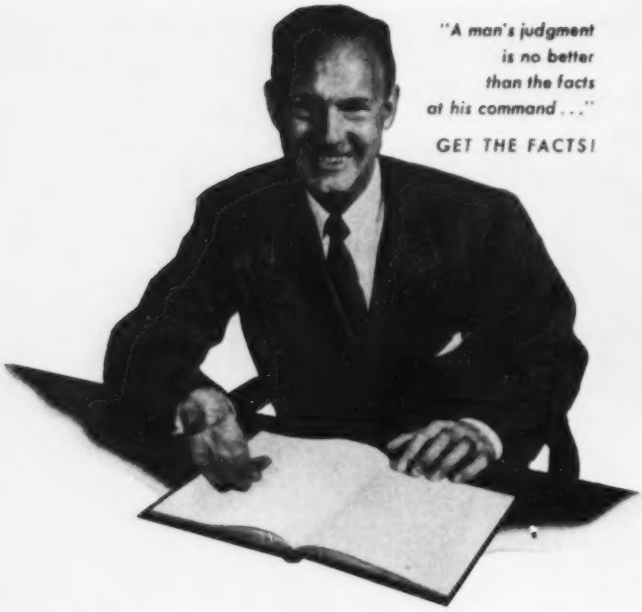
Simple full-load and light-load adjustments—readily accessible from the front, exceptionally clear visibility, and easy removal of registers, are a few of the reasons why J Meters are favorites with meter testers everywhere! They're faster to test—easier to calibrate. An ordinary screwdriver is the only tool needed.

Economical replacement of parts is another of the reasons why the men who work with meters prefer J Meters. When advantageous, either the current or potential element may be replaced separately.

Only Measured Facts are Known Facts

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Sangamo J Meters have proved their ability to meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.



"A man's judgment is no better than the facts at his command . . ."

GET THE FACTS!

Reports
Business Surveys
Appraisals

Only when you have comprehensive, accurate, and reliable facts at hand can sound decisions be made.

Commonwealth's specialists—with years of experience in financial work, engineering, taxes, insurance, and the many other phases of today's business activity will analyze the many factors affecting the operations and future outlook of a given business or industry.

As a preliminary to investment; to obtain a perspective on existing business or future expansion; to get all the facts — use a Business Analysis by Commonwealth as your blueprint for sound executive decision.

INVESTIGATIONS
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METERING
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INDUSTRIAL & PUBLIC RELATIONS
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ADVERTISING
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We invite your inquiry. Write for our booklet describing in detail the many services available to you.

Address: Department A
20 Pine Street, New York 5, N.Y.

Commonwealth Services Inc.

and subsidiaries
COMMONWEALTH ASSOCIATES INC.
COMMONWEALTH GAS CONVERSIONS INC.
20 Pine Street, New York 5, N.Y.
Jackson, Michigan *Washington, D.C.*

and permits group fusing of several motors on a single branch circuit. Cover is interlocked to prevent opening when switch is closed. Further description is given in Bulletin 2510-R.

Square D Co, 4041 North Richards St, Milwaukee 12, Wis.

Industrial Magnifier

Electrically lighted for self-contained direct illumination of the object, instrument comes equipped with

battery-powered or 110-v handle, or with non-illuminating handle and a metal tripod.

Lens system magnifies 5 times and

why splice needlessly?

DURASHEATH goes *all* the way—underground, overhead, in ducts—without splices

Splicing cable is time-consuming . . . and costly. What's more it is avoidable. All-purpose Durasheath* can be used for almost any distribution need up to 5 kv.** It can be run in one continuous length, regardless of location . . . buried underground . . . strung overhead . . . or easily pulled through ducts. No expensive splices are necessary . . . no weak power links . . . no cluttered inventory. One cable—flexible, light Durasheath—goes all the way. You can stock *one* type instead of *three*.

Durasheath handles easily and is used in self-supporting aerial assemblies. Its rugged neoprene jacket resists moisture, chemicals, sunlight, organic decay, corrosion, electrolysis, abrasion, and mechanical injury.

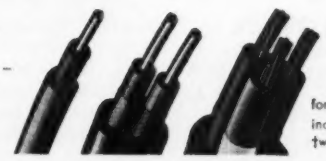
For *reliable* power distribution at *lower* installation cost, insist on versatile Durasheath. Consult your Anaconda Representative. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Trademark

the right cable for the job

ANACONDA® **wire and cable**

available in all sizes – from large to small – one to three conductors – **can be supplied for services up to 15 kv. Consult Anaconda for recommendations.



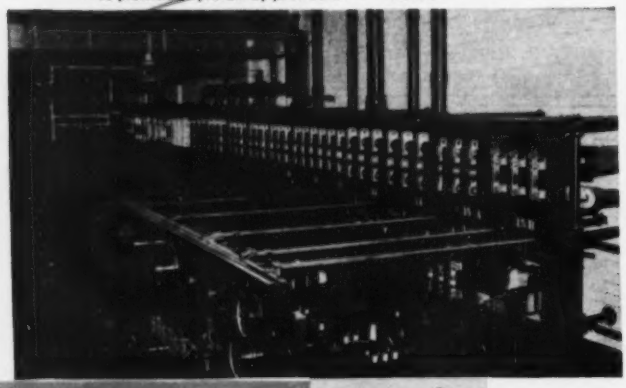
for traffic control, airport† power and lighting, mines, industrial plants, railroads, street lighting and many other uses

†when ordered to CAA Specification L-824

Anticipate* Destruction

Amp-trap PREVENTS DEVELOPMENT OF HEAVY SHORT CIRCUIT CURRENTS

* To preclude or prevent by prior action — Webster



SHAWMUT Amp-trap*

"T. M. REG. U. S. PAT. OFFICE"

Amp-trap installation at Bird & Son, E. Walpole, Mass., raised the interrupting capacity of the system from 20,000 amperes to 100,000 amperes R.M.S. at 600 Volts, 60 Cycles.

NEW, LOW-COST SHORT CIRCUIT PROTECTION

Amp-trap, with its 100,000 RMS Interrupting Capacity, opens the circuit so fast that it *precludes* the development of the peak available short circuit current. Consequently, it *prevents* both magnetic and thermal destruction. Even phase-to-ground faults are cleared so quickly that multi-conductor faults are usually avoided.

CERTIFIED AND APPROVED

Amp-trap is listed by Underwriters Laboratories. Interrupting tests up to 202,000 amps at 500v 60 cycles have been witnessed and certified by Electrical Testing Laboratories, Inc. Amp-trap is favored by many insurance companies.

FOR SYSTEMS OLD OR NEW

Amp-trap is supplied in all standard ratings up to 4000 amperes for application on any circuit up to 600 volts AC or DC. It can be used on either old or new switchgear with a minimum of structural rearrangement. "Outage" time for installation is negligible. There is no better way to insure your investment in switchgear, bus-ducts, motor starters, circuit breakers and current transformers. Every service entrance on a network system needs Amp-trap protection. The list of Amp-trap users reads like the Blue Book of American industry. Investigate now.

"You Can Get Amp-traps"

WRITE FOR FREE AMP-TRAP BULLETIN TODAY.

REGISTERED U.S. PATENT OFFICE

AMP-TRAPS — *Always At The Switch*

THE CHASE-SHAWMUT CO.

370 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

Amp-trap Trion -tā- C-Q-T Trinol -Q-T- FUSE WIRE

is said to be corrected for all spherical and chromatic aberration and distortion, giving a wide flat field.
Bausch & Lomb Optical Co, Rochester, N. Y.

Recording Potentiometer

This recorder is the null-balancing, or potentiometer type, and features a case only 15¾ x 11½ x 14¾ in., two 12 AVT and two 12 AX7 tubes that require no matching, a counterbalanced pen which lifts automatically when the chart frame is opened. The frame swings out 180 deg.

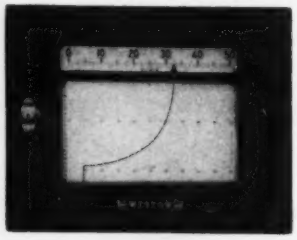
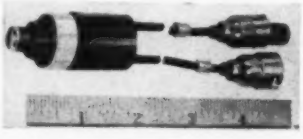


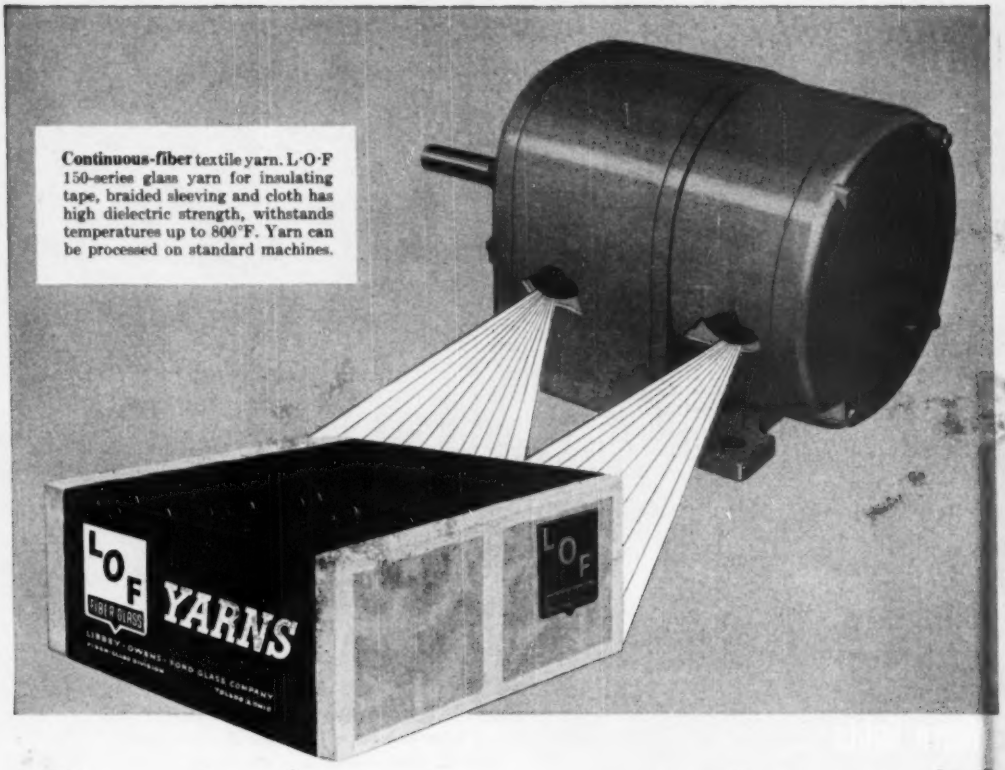
Chart speeds are variable from inches-per-hour to feet-per-minute and various ranges are also provided. The recorder will measure and record temperature, voltage, current and other quantities that can be converted into electrical values. A brochure is available from the manufacturer.
Weston Electrical Instrument Corp, 617 Freylinghuysen Ave, Newark 5, N. J.

Push-button Switch

This single-throw one-circuit waterproofed switch was designed to meet military specs, is said to function from −65 to 165F, withstand salt spray, shock, vibration.



Furnished normally "open" or "closed," switch has a continuous rating of 10 amp at 15 v dc, 30 v dc, 125 v ac. Ordance-type waterproof leads are vulcanized into the rubber case, with waterproof connectors when required. Easily installed in panels to



Continuous-fiber textile yarn. L·O·F 150-series glass yarn for insulating tape, braided sleeving and cloth has high dielectric strength, withstands temperatures up to 800°F. Yarn can be processed on standard machines.

Threads that give motors longer life

L·O·F Fiber·Glass resists high heat; offers unusual space-saving advantages

The ability of fibrous glass to resist high temperatures increases the life of electric motor insulation, and of the motor itself. Even when there is heavy overload, L·O·F Fiber·Glass stands up.

Superior insulating qualities of L·O·F Fiber·Glass, combined with its lightness in weight and tremendous tensile strength, make it possible to design smaller, lighter motors and generators without reducing output.

Fiber·Glass fights the most destructive enemies of electrical insulation. It has low moisture pickup, is rotproof, resists the effects of corrosive liquids and gases.

If you want to give longer life and greater efficiency to motors, generators, wire and cable, discuss your insulation problems with us. Contact your local L·O·F office (district offices in 24 major cities). Or write, wire or phone Libbey·Owens·Ford Glass Company, Dept. F·G 1082, Nicholas Bldg., Toledo 3, Ohio. We will be happy to work with you.

LIBBEY·OWENS·FORD GLASS COMPANY
FIBER·GLASS DIVISION

L·O·F GLASS · PLASKON · L·O·F FIBER·GLASS

FIBER·GLASS

Where lights must be kept burning, specify SILASTIC* lead wire

In the chemical industry where lights, essential to the safety of working men, burn 24 hours a day; along the runways of airports; in railway yards and control towers; along the docks and in beacon lights off-shore; Silastic-covered lead wire can assure continuous, trouble-free operation, and pay for itself in reduced maintenance and replacement costs alone. ¶ In the huge Midland plant of The Dow Chemical Company, for example, all lighting circuits are carried in conduit that doubles as supports and hangers for more than 50,000 lighting fixtures. Many of these are vapor-proof or explosion-proof fixtures where heat is a more serious problem. Over half of these fixtures burn constantly. Most of them are exposed to outdoor weathering. ¶ Under those conditions, maintenance and replacement were such a costly problem that engineers in the Electrical Department tried, and now specify, lead wire insulated with Silastic. This Dow Corning silicone rubber is the only kind of rubbery insulating material that retains good dielectric properties and will not crack or become brittle after long and continuous exposure to outdoor weathering at temperatures from —70° to +350° F. ¶ Silastic is also used as a gasketing and sealing material in hundreds of aircraft and automotive applications, at temperatures ranging from —100° to more than +300° F. It is unique among electrical insulating materials for Class B and Class H lead wire, for ignition and Navy control cable, and for transformers and field coils in traction motors.

Put Silastic to work for you; mail this coupon to:

Dow Corning Corporation, Dept. AY-20
Midland, Mich.
Please send me:

- ☐ Silastic Facts 10a with new data on properties and applications of all Silastic stocks and pastes.
- ☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

Name _____
Title _____
Company _____
Address _____
City _____ Zone ____ State _____

*T.M. Reg. U.S. Pat. Off.

DOW CORNING SILICONES

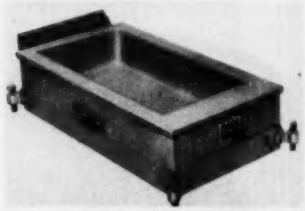
DOW CORNING CORPORATION
Midland Michigan

Atlanta · Chicago · Cleveland · Dallas · New York · Los Angeles · Washington, D. C.
In Canada: Fiberglas Canada Ltd., Toronto · In England: Midland Silicones Ltd., London

⅛-in thick, through ½-in hole. Overall length and largest diameter, approximately 2 x 15/16 in.
Riverside Mfg & Electrical Supply Co, 10228 Michigan Ave, Dearborn, Mich.

Dip Soldering Pot

An electric dip solder pot features ceramic embedded heating elements rated at 900w, 110 v ac. Adjustable thermostatic control is provided. In-

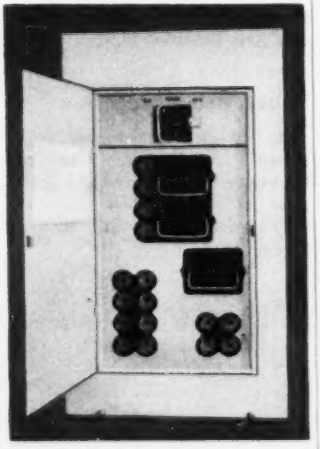


side dimensions are 12 x 6 x 2⅛ in.

The temperature range is 450 to 700 F. Legs are adjustable for levelling the unit and a detachable tray at one end serves as a receptacle for dross. The unit is designed for dip soldering of large assemblies.
Dee Electric Co, 1101 North Paulina St, Chicago 22, Ill.

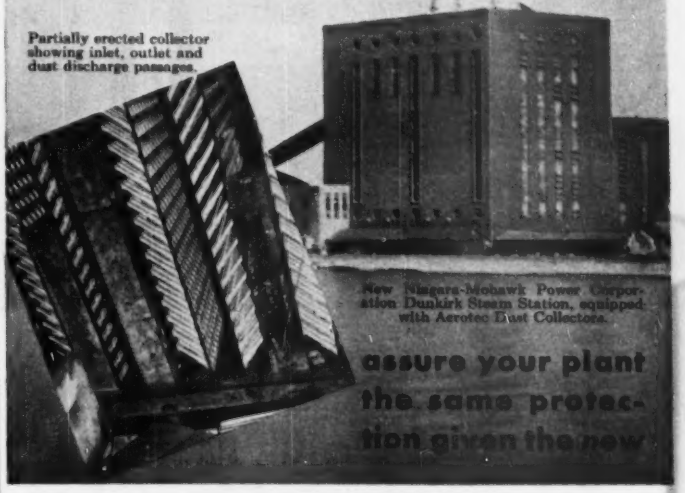
Service Entrance Unit

A 100-amp combination service unit has been designed to provide both service entrance and branch distribution in one unit. Five different com-



binations are available. Basic unit contains a 100-amp main, magnetic pullout, 30 amp water-heater fusible circuit breaker, 60 amp range fusible

high efficiency AEROTEC **DUST COLLECTORS**



Partially erected collector showing inlet, outlet and dust discharge passages.

New Niagara-Mohawk Power Corporation Dunkirk Steam Station, equipped with Aerotec Dust Collectors.

assure your plant the same protection given the new

NIAGARA MOHAWK POWER CORPORATION

Dunkirk Station... and a duplicate Albany Plant

At the new Dunkirk Steam Station of Niagara Mohawk Power Corporation, two reheat steam generators of 670,000 lb. per hour capacity are pulverized fuel-fired. Dust collection for this station is handled by Aerotec, Design 3 RAS Collectors, and a duplicate system is under construction for the new Albany Steam Plant . . . making a total of eleven Niagara-Mohawk boilers to be equipped with Aerotec Dust Collectors.

The collectors for Dunkirk and Albany consist of 84 "Unit Building Block" elements completely assembled at the factory for easy erection in the field. The small diameter tubes, of permanent molded aluminum construction, have proved their extremely high collection efficiency and long life on hundreds of installations. Their light weight cuts steel requirements for supporting structure, and makes possible roof installations with a minimum of reinforcement. The light weight tubes also reduce erection costs.

Aerotec efficiencies meet or exceed the requirements of most dust ordinances today. Evenly spaced tube outlets provide excellent inlet flow conditions for an AEROTEC electrical secondary—should future ordinances require still higher efficiencies.

Write for the new Design 3 RAS Catalog No. 601.

Project and Sales Engineers

THE THERMIX CORPORATION

GREENWICH, CONNECTICUT

(Offices in 38 Principal Cities)

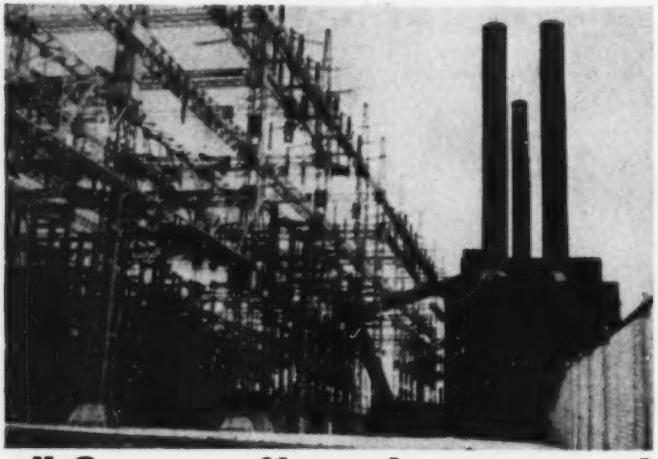
Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec • 983 Bay St., Toronto 5, Ontario

THE AEROTEC CORPORATION

GREENWICH, CONNECTICUT

Manufacturers of mechanical dust collectors, electrical precipitators, air cleaners, industrial integral dust collectors, gas-oil scrubbers and dust reclaiming equipment.

T and D, Plant and Fence...



all 3 more efficiently maintained by Subox anti-corrosive paints

This midwestern electric power plant is one of the many across the nation that rely on time-proved Subox paints for durable, thrifty and simple maintenance.

Providing maximum protection, Subox and Subalox can serve as primers, finishing coats or both; as a spot coat, a single complete coat or a combination of both. These two versatile and famous paints can be applied over new, rusty or old painted surfaces, including galvanizing. They're rust-inhibitive, weather resistant, and effective against moisture, fumes and condensation.

BACKED BY A QUARTER CENTURY OF SUCCESSFUL APPLICATION

For 25 years Subox and Subalox have saved time and money successfully for users throughout the United States and Canada. The broad and repeated acceptance of Subox paints reflects the skill and experience of the Subox men who have devoted most of their lives to distinguished maintenance service in the industrial field.

Subox paints are more efficient because they have a distinctive basic pigment. It is *chemically active suboxide of lead*, Pb_2O and it makes Subox unique — the paints practical utility men are using, more and more. Available in a range that covers every phase of the electrical industry.

Write for full information and simplified paint systems data.

Subox Inc.

3 FAIRMOUNT PLANT HACKENSACK N J

pullout and 12 plug-fuse branch circuits.

The four other units offer in addition, four extra plug-fuse branch circuits, eight extra plug-fuse branch circuits, a 30-amp dryer fusible pullout, and a dryer pullout and four extra branch circuits as illustrated. It is designed to fit between building studs and is 12⅞ inches wide.

Murray Mfg Co, 1250 Atlantic Ave, Brooklyn 16, N. Y.

Dictation System

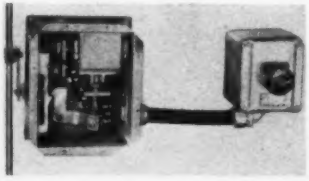
Incorporating dictation and transcribing equipment, this system allows remote dictation from many desks into a single recorder. Completed dictation can be transcribed while additional work is being recorded, and other personnel cannot interrupt while recorder is in use.

System provides for listening while recording, playing back, making corrections, indicating end of letter.

Pierce Dictation System, 1328 Sherman Ave, Evanston, Ill.

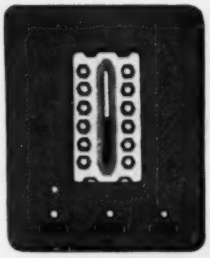
Punch Press Stop

A new electro-mechanical punch press stop, called Presstop, holds down the treadle or hand lever of a punch press for continuous operation. The device releases the treadle instantly

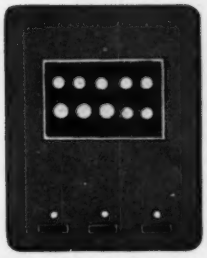


when the operator pushes the stop button. In event of power failure, the press stops automatically, and the

Rapidly Growing Using the DIAMOND "UTILISCOPE"



Boiler water level observation



Burner pilot observation

Boiler furnace combustion observation

Stack smoke discharge observation

Utilities listed below have purchased the Diamond "Utiliscope" for one or more of the uses shown. Images are brought to the boiler control panel where the operator can see them at all times.

***Ohio Power Co.**
Tidd Station
Muskingum River Plant

***Consolidated Edison Co.**
Hellgate Station
Hudson Avenue Station
Waterside Station
East River Station

***Commonwealth Edison Co.**
Fisk Street Station
Ridgeland Station

***Board of Water & Electric Light Comm.**
Ottawa Station,
Lansing, Mich.

***Cincinnati Gas & Electric Co.**
Miami Fort Station
Clermont Station
Walter C. Beckjord Station

***Illinois Power Co.**
Wood River Station

***Oklahoma Gas & Electric Co.**
Mustang Station

***Indiana & Michigan Elec. Co.**
Twin Branch Station
Tanners Creek Station

***Appalachian Electric Power Co.**
Phillip Sporn Station
Kanawha Station
Graham Station

***Northern Indiana Public Service Co.**
Michigan City Station

Public Service Co. of Indiana
Noblesville Station

Union Electric Power Co.
Venice Station

Northern States Power Co.
Minneapolis Station

***Dayton Power & Light Co.**
Hutchings Station

Buffalo-Niagara Electric Corp.
Huntley Station

***Duke Power Co.**
Dan River Station
Lee Station
Riverbend Station

Union Electric Co. of Missouri
Meramac Station

Elecktricitaetssakskabet
Kydnby Power Station
Isefyordraerkat,
Denmark

***Niagara Mohawk Power Corp.**
Dunkirk Station
Oswego Station
Huntley Station
Albany Steam Station

The "Utiliscope" is simple, stable, remarkably durable. It requires no technical skill for operation. Cost is low and is quickly amortized by labor saving and improved operation. Write for Bulletin 1025-X

***Societa Edison—Centrale diGenova**
Genova, Italy
Piacenza, Italy

Central Hudson Gas & Electric Corp.
Danskammer Station

***Tennessee Valley Authority**
Johnsonville Steam Plant
Widows Creek Plant
Shawnee Steam Plant
Kingston Steam Plant

Chicago District Electric Generating Corp.
State Line Station

***Public Service Co. of N. Illinois**
Station No. 6
Dixon Station

Kansas Gas & Electric Co.
Murray Hill Station

***Long Island Lighting Co.**
Port Jefferson Station
Far Rockaway Station
Glenwood Landing Station

Toledo Edison Co.
Acme Station

***Philadelphia Electric Co.**
Delaware Station
Richmond Station

Cleveland Electric Illuminating Co.
Eastlake Plant

Indianapolis Power & Light Co.
White River Station

Virginia Electric Power Co.
Chesterfield Station

***Southern California Edison Co.**
Etiwanda Station

San Diego Gas & Electric Co.
Silver Gate Station

Monongahela Power Co.
Albright Station

***Electricite de France**
Nantes Chivire Station
Arrighi Station

***New York State Electric & Gas Corp.**
Goudey Station
Greenidge Station

**Repeat orders have been received from these utilities.*

"UTILISCOPE" REGISTERED U. S. PATENT OFFICE

DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • *OFFICES IN 39 PRINCIPAL CITIES*
Diamond Specialty Limited — Windsor, Ontario
Since 1903, Diamond has Manufactured Quality Equipment For Industry

WRITE FOR BULLETIN 1025

4831

GET
FAST INSTALLATION
COST-CUTTING ECONOMY
DEPENDABLE PROTECTION
with
BERMICO®
FIBRE CONDUIT

Bermico Fibre Conduit is easy to work and handle. Lightweight 8-foot lengths can be cut and tooled right in the field. Smooth inside bore assures quick "pull throughs" without chafing or abrasion.

Bermico Fibre Conduit holds down costs. Lays in a jiffy. Water-tight couplings go on fast—no sealing compound needed.

Bermico Fibre Conduit is engineered to withstand shocks and stresses of haulage—the heavy loads imposed during installation.

Complete line of bends plus angle couplings enable you to meet unusual field conditions.

Specify BERMICO—*for long service at low cost.*

Distributed by

WESTINGHOUSE
Electric Supply Company
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CORPORATION, La Tuque, Quebec

SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

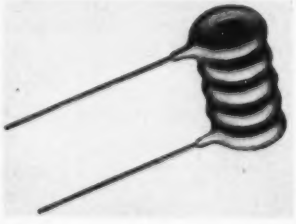
clutch must be engaged manually before the press can be restarted.

During operation the solenoid switch is continuously energized, which allows the safety feature. A special cut-out switch permits single stroke operation. Device is designed for 110 or 220v 60-cycle operation. **Brinnell Co, Simsbury, Conn.**

Copying Machine

The Copyflex 14 is a desk-side machine reported capable of copying any office form up to 20 in. in a matter of seconds, reducing paperwork costs. The machine makes low-cost positives of typed, printed and drawn material.

This copying machine needs no masters, inks, or special installation. Operating from standard 115v, 60 cycle circuit, it is movable on casters and can be operated by office employees with no special training. **Charles Bruning Co Inc, Teterboro, N. J.**



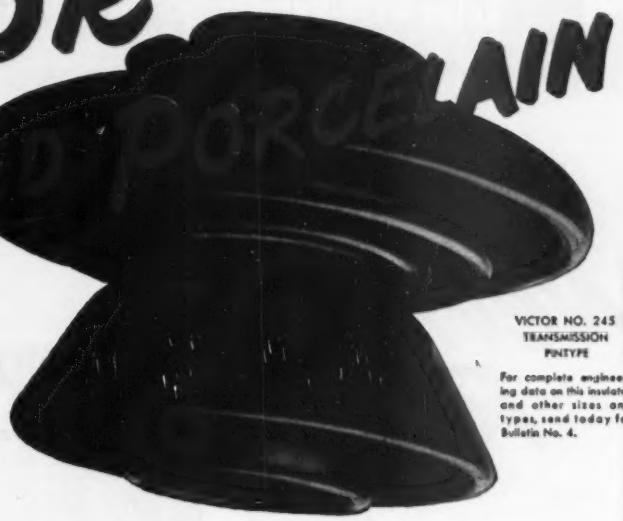
Instrument Resistors

Precision resistors, said to function in ambient temperatures in excess of 235 C, have a total change in resistance under 0.2% from 55 C to +125 C.

The resistors are small, with standard tolerances of 1% and special tolerances to 0.1%. They are available in values to 25,000 ohms and 6-w power ratings. **Instrument Resistors Co, Commerce Ave, Union, N. J.**

IMPROVED THERMAL RESISTANCE WITH

VICTOR PURIFIED PORCELAIN TRANSMISSION PINTYPES!



VICTOR NO. 245 TRANSMISSION PINTYPE

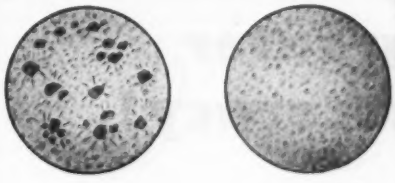
For complete engineering data on this insulator and other sizes and types, send today for Bulletin No. 4.

More Uniform Thermal Expansion Achieved

VICTOR *Purified* Porcelain has the most uniform thermal expansion ever achieved in the insulator field—expansion that remains uniform throughout its entire mass. This achievement, like *Purified* Porcelain's many other advantages, is due to the removal of all mineral salts from the water used in processing.

With VICTOR *Purified* Porcelain, failure of shells due to sudden thermal changes is eliminated. Choose VICTOR TRANSMISSION PINTYPES—made of *Purified* Porcelain—finest insulator porcelain ever made!

VICTOR INSULATORS, INC. VICTOR, N. Y.



Cross-Section of Ordinary Porcelain

Cross-Section of *Purified* Porcelain

Here's Why *Purified* Porcelain Has Uniform Expansion

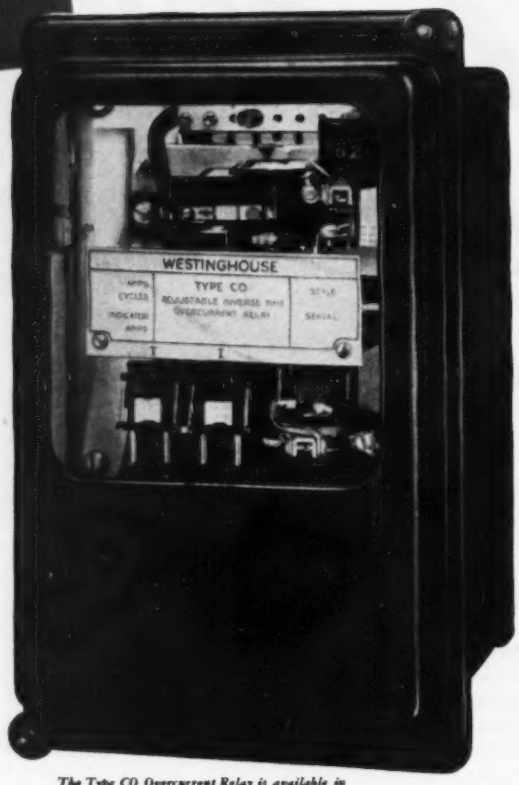
The drawing at the left shows a greatly enlarged section of ordinary porcelain and reveals what ceramic authorities agree contributes to porcelain weakness and possible failure under unusual service conditions. The various irregular shapes are glass-like impurities which are formed during firing, by mineral salts in the processing water. After firing, these impurities shrink at a different rate than does the porcelain itself, causing tiny fissures (shown by the dark radiating lines) which physically weaken the insulator and make it more vulnerable to puncture. Also, these differing rates of thermal expansion set up dangerous strains and stresses during sudden temperature changes in service that can actually weaken the insulator.

The drawing at the right shows the homogeneous quality of *Purified* Porcelain. Its absence of impurities gives uniform thermal expansion and lessens the possibility of failure under extreme conditions. Other advantages: maximum density and hardness, higher mechanical impact values, improved range of M and E strength values and higher oil puncture values!

Another Westinghouse Relay Development

New CO Relay

gives greater accuracy!



The Type CO Overcurrent Relay is available in Flexitest or standard rectangular projection case.

This latest advance in design gives a degree of accuracy heretofore unattainable in an induction disc relay. The reason—a new basic relay development—the "E" element.

The "E" element has four separate and independent adjustments to make it meet existing time curves accurately—very accurately! This high degree of accuracy permits faster protection for your lines and equipment.

For further assurance of accuracy the new CO Relay offers low-wave form and low-temperature error . . . micrometer adjustment of the permanent magnet . . . constant "pick-up" at all lever settings.

Ask your Westinghouse representative to show you the new CO Relay—he'll be glad to go over it feature by feature with you—or request a demonstration by writing to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40404

You can be sure...if it's Westinghouse

RELAYS

LETTERS TO THE EDITOR

Protecting Control Cable

To the Editor:

On Page 54 of the June 30 issue it stated: "Control circuits are open-circuited but energized most of the time. Failure of early pvc control cables have been attributed to endosmosis at the negative dc lead."

In our corrosion prevention efforts, we attempt to keep the potential of our underground cable lead sheaths and pipes at a negative potential with respect to the surrounding earth. We are using various coating materials including neoprene, pvc, coal tar enamels, and other materials. We are interested in the manner in which the materials deteriorate, particularly under the influence of dc voltages.

F. E. Kulman
Engineer
Consolidated Edison Co of New York
4 Irving Place
New York 3, N. Y.

Clarification of a Report

To the Editor:

In reading over the report of the discussions of the Sealey-Vogel paper (read at the summer general meeting of the American Institute of Electrical Engineers) on Page 238 of the July 14 issue, I was impressed by the statement, correctly quoted, of Mr Meador. In turn reading the quotation of my reply, it seems that the inference that transformers designed according to our proposal would be skimpy was not refuted.

In my reply I am reasonably certain that I stated that no reduction in the service-ability of a transformer, either for impulse, switching, or steady voltage is contemplated, as well as that no change in standards were being now requested. Similar requests have been previously proposed and are still under discussion. But the development work of other designers has not reached the point where they desire them.

F. J. Vogel
Allis-Chalmers Mfg Co
Box 512
Milwaukee 1, Wis.

• We are happy to have Mr. Vogel clarify the statement which he made at the AIEE meeting.

SEN WALLACE F. BENNETT

Correcting the Record

To the Editor:

The editorial which was printed in the July 14 issue of Electrical World amazes me! It is difficult for me to believe that my speech before the Edison Electric Institute could possibly have left the impression it did. It is also difficult for me to believe that you could have read my whole speech carefully if you considered its phrases, which you quoted correctly, represented my personal attitude.

You say in your editorial that I was not only speaking for myself but as an interpreter of the attitude of other Congressmen. I certainly was not speaking for myself. I was attempting to interpret a point of view that I have been sad to find among many men in Congress. Of course, it is usually veiled with lip-service to economy, but it is there, nonetheless.

I am sure a reference to my voting record on those issues in which these attitudes are involved will show that my position is exactly the opposite to your impression of it. That my speech could have left any such impression disturbs me greatly, as does the unfortunate implication that your editorial must leave among my friends in the power industry. I shall be grateful if you can find time to reread the text of the speech and then take any steps that suggest themselves as proper under the circumstances.

Wallace F. Bennett
United States Senate
Washington 25, D. C.

• See Editorial Page 102.

World's Longest Span

To the Editor:

As a subscriber and as manufacturers of line fittings and equipment, we want to correct a misstatement in the article on the Kootenay line span in the April 28 issue.

The Kootenay crossing is not the longest span in the world. The longest is the Messina Straits crossing that is now under construction. This span from Calabria to Sicily will be 3,650 meters (2.268 miles). The two 224-meter-high towers will eventually carry six (at present four) 220-kv cables. Minimum height above the water will be 70 meters. This is important because of the sea traffic.

We shall be very grateful . . . if [you] will rectify in your esteemed revue the indication "world's longest span" that is to be given by right to the Messina crossing.

Societa Elettro-Morsetterie Volpato
Via Bonaventura Cavalieri, 3
Milan, Italy

• The Kootenay span of 10,656 ft, only 86 ft over 2 miles, is a bit shorter. EW hopes to carry an article on the Messina span when it is completed.

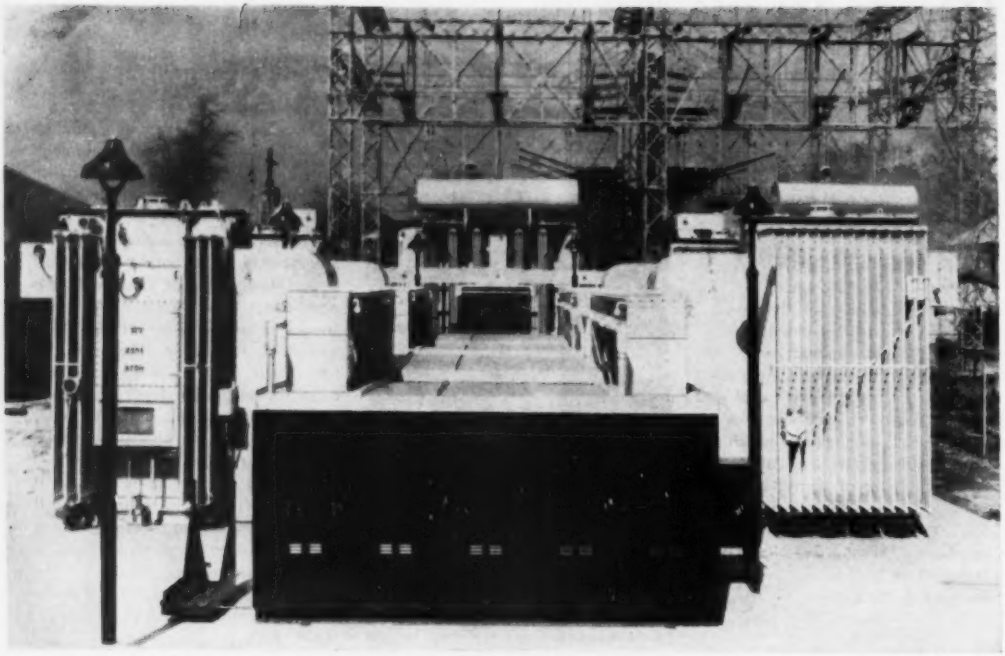
DC Too Costly

To the Editor:

Your issue of June 23 (CIGRE Discusses Voltage Practices—p 32) quotes me as saying, "the conditions under which direct current transmission could be employed must form part of every project investigation from now on," at the recent CIGRE meetings in Paris. I made no such statement. I did say, in recalling a discussion of mine before the 1946 CIGRE meeting, at which direct current transmission was given prominence, that the Bonneville Power Administration had studied direct current as a means of high capacity transmission but found it too costly.

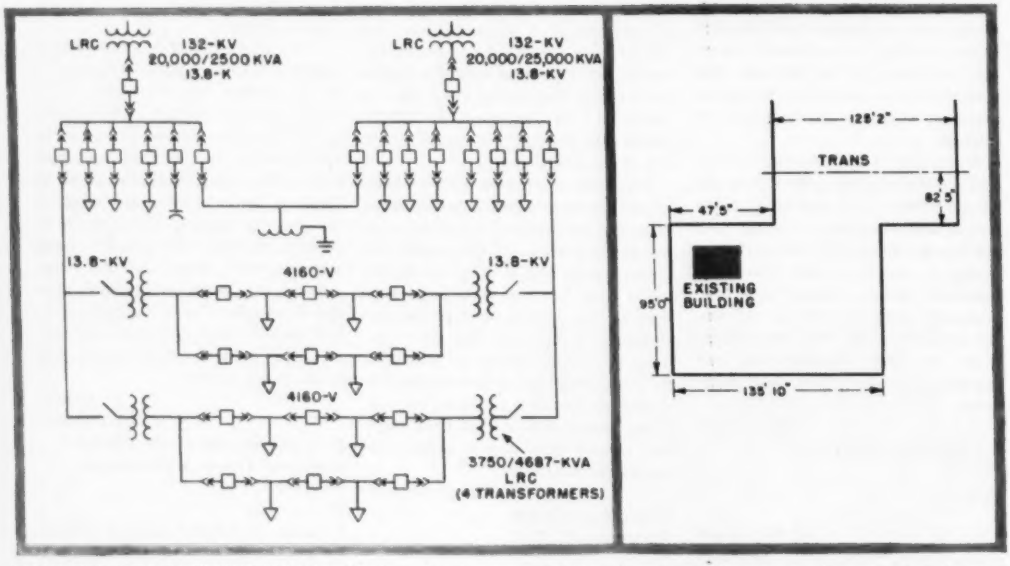
S. E. Schultz
Chief Engineer
U. S. Department of the Interior
Bonneville Power Administration
Portland 8, Ore.

• Thanks to CIGRE delegate Schultz for a clarification of his position on dc transmission.

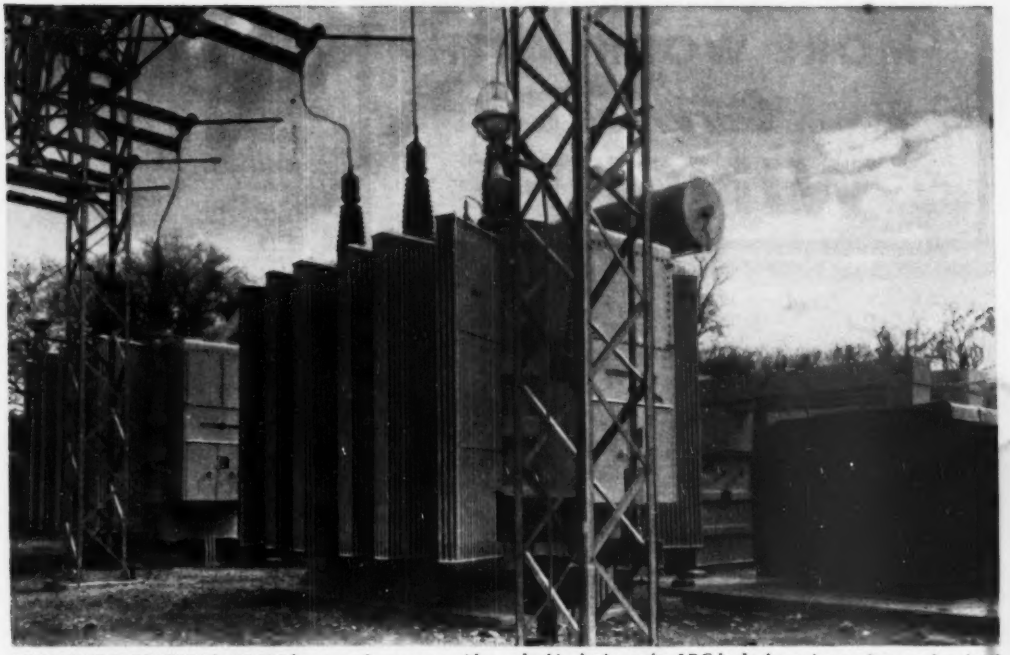


SAN ANTONIO'S 10TH STREET SUBSTATION, one of the largest built by General Electric, is rated at 40,000/50,000 kva, serves its area through nine outgoing 13,800-v feeder circuits in addition to eight 4160-v circuits fed from duplex units.

Utility just draws one-line diagram and



PLANS FOR UTILITY EXPANSION begin with these drawings. A one-line diagram, shown at left, and a simple plot-plan are all that G-E engineers needed to start work on big unit substation for San Antonio. Installation was completed in record time.



LOAD RATIO CONTROL in 25,000-kva transformers provides bus regulation for the 13,800-volt feeders, two of which feed double-duplex units. LRC in duplex units regulates each pair of 4160-v feeders. The substation supplies downtown San Antonio.

plot-plan to specify 50,000 kva substation

An example of fast, low-cost expansion with G-E unit substations.

The 10th Street substation in San Antonio was planned to feed the city's rapidly expanding system. The utility found it had only to furnish General Electric a simple plot-plan and one-line diagram—similar to those shown at the left—to get the job started fast.

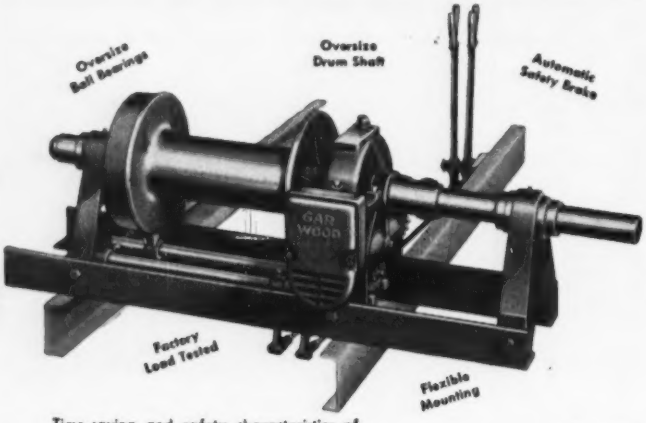
Working from these drawings, General Electric easily and quickly provided a large, double-duplex master unit substation, rated at 40,000/50,000 kva. This standardized equipment answered space requirements as well as the needs of the utility's fast-growing loads.

The City Public Service Board's experience with this G-E substation is further evidence of the trend to standardized equipment in utility expansion programs. G-E unit substations, with their great flexibility, find application in a variety of system arrangements. For full information, write for Bulletins GEA-3800 and GEA-4500. *General Electric Company, Schenectady 5, New York.* 321-101

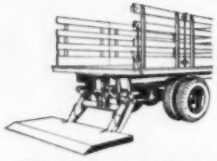
BRACKENRIDGE SUBSTATION: One of 30 similar substations installed on San Antonio's system. G-E equipment simplifies expansion.

GENERAL ELECTRIC

MORE WORK WITH
Gar Wood
WINCHES



Time-saving and safety characteristics of Gar Wood Truck Winches mean more work per hour . . . exceptionally rugged construction means much longer life and more work per winch. Check the features mentioned above . . . they assure you superior performance from Gar Wood Winches. Capacities from 15,000 lb to 100,000 lb. Write for Bulletin WC-204.



Gar Wood Elevating End-Gate reduces pick up and delivery costs; ask for Bulletin L-101

Gar Wood
TRUCK CRANES

Power operated, they greatly increase productive truck hours and save many man hours. Require minimum space behind cab. Built in variety of sizes from 2,000 to 24,000 lb. Write for Bulletin WC-202.

52-6

GAR WOOD GW INDUSTRIES

GAR WOOD INDUSTRIES, INC.

Wayne Division • EXECUTIVE OFFICES, WAYNE, MICHIGAN

TRUCK EQUIPMENT: Dump Truck Bodies & Hoists, Winches & Cranes, Refuse Collection Bodies, Elevating End Gates. CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders.

WHAT THEY'RE SAYING

At Industry Meetings

Atoms and Electrical Power

NORMAN L. MOCHEL, manager of metallurgical engineering, Westinghouse Electric Corp, before the American Society for Testing Materials at New York.

The production of electric power from atomic energy in plants primarily built with that end in view may soon become economically possible. This is due to the technical advances now being made in mobile power units for military purposes.

Because a large percentage of the engineering manpower in the country is carrying on extensive studies of reactor problems, the power industry can be very optimistic about the date when electric power will be generated with atomic power as the heat source.

The development of useful power from atomic fission has been in progress since 1946 but only a few hundred watts of electric power have been thus far developed. From studies made by executives of electric utilities and a group of utilities studying the problem for the AEC, the general conclusion may be reached that the economics of atomic power are not too attractive without the sale of the by-product, plutonium, to the government.

Technology Is the Answer

R. A. SCHLEGEL, sales manager, petroleum industry for the Industrial Div, Minneapolis-Honeywell Regulator Co, before the American Society of Mechanical Engineers at Cincinnati, Ohio.

The nation must rely more and more on industrial instrumentation and other technical developments if it is to offset the increasing imbalance between the number of workers and the number of consumers. Because workers are retiring at an earlier age and fewer persons are entering the labor force due to the low birth rate of the thirties plus the current military service draw, the labor force will remain almost constant up to 1960. During this same period however, the population will rise to an estimated 182 million. By 1953 alone we'll need something like a million more workers than the normal increases will supply.

The increased application of auto-

Easy to install...

That's why TRANSITE DUCTS save time, labor and money

THESE "ON THE JOB" photographs show why savings begin right at the start of the installation when you use Transite* Ducts.

The light weight of Transite Conduit and Korduct permits hauling a substantial footage of duct per truck. Handling is fast, too, because the asbestos-cement composition of Transite Ducts makes them strong and tough. The longer length of each duct . . . 10 feet . . . reduces the number of joints in the completed line. And joints are quickly made with the Transite Tapered Coupling that is engineered to stay tight in service.

For the full story of how Transite Ducts can reduce your cableway costs, write Johns-Manville, Box 60, New York 16, New York.

4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

1. Corrosion-Resistant. Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.

2. Permanently Smooth Bore. Transite makes long cable pulls easy. Danger of damage to cables is also minimized.

3. Incombustible. Transite will not burn nor contribute to formation of smoke, gases, or fumes . . . confines burn-outs and protects adjacent cables permanently.

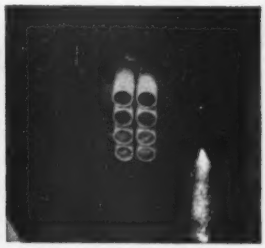
4. Higher Thermal Conductivity. Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

Easy to Handle: Working in a deep trench, this man finds that the light weight of Transite Ducts helps him work without undue strain.

*Reg. U. S. Pat. Off.

Speeds Installation: Transite Ducts are joined so rapidly that the assembly man can often follow right behind the trencher . . . as shown in this installation.

Speeds Distribution: The light weight of Transite Conduit enables the contractor to haul a large number of ducts per truck and speed distribution on job site.



Cuts Manhole Costs: Concrete will be poured directly around these Transite Ducts to form the manhole wall, a time and material saving made possible by Transite's strength.

JOHNS-MANVILLE PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

for trouble-free service
specify
KNOX
proof test
puncture proof
impact strength 55 inch-lbs.
zero porosity
combined M & E 15,000 lbs.
thermal shock
KNOX High Voltage Insulators are Quality made — the Results of 30 YEARS of Experience, rigidly inspected not only to meet laboratory tests and specifications but to give trouble-free service to the users. Sell KNOX Insulators . . . . Insulators your customers prefer. Our ample stocks insure PROMPT deliveries.
KNOX PORCELAIN CORP.
KNOXVILLE 1, TENNESSEE
WRITE FOR ILLUSTRATED CATALOG showing the complete line of KNOX insulators and electrical wiring devices

matic methods of production, through instrumentation is the only feasible method of preparing for this population versus production problem.

Engineers' Achievements

HARTLEY W. BARCLAY, Industrial Advertising Manager, The New York Times, before the Annual Meeting of the New York Chapter of the New York State Society of Professional Engineers.

Let us review briefly some of the major tasks and assignments, the most important problems of economic and social survival that the American people have brought to the nation's engineering leaders. Flood control and waterway improvements, national defense production, transportation, smoke control, improved water supply and increased safety are but to name a few.

The engineering profession is looked for to insure aviation safety, reduce costs of industrial production, improve communications and increase power generation and fuel supply. The engineer's achievements in electronics, chemical and civil engineering, hydraulics, mechanical power transmission and other advanced fields is so vast, that successful performance of these tasks is taken for granted in this country.

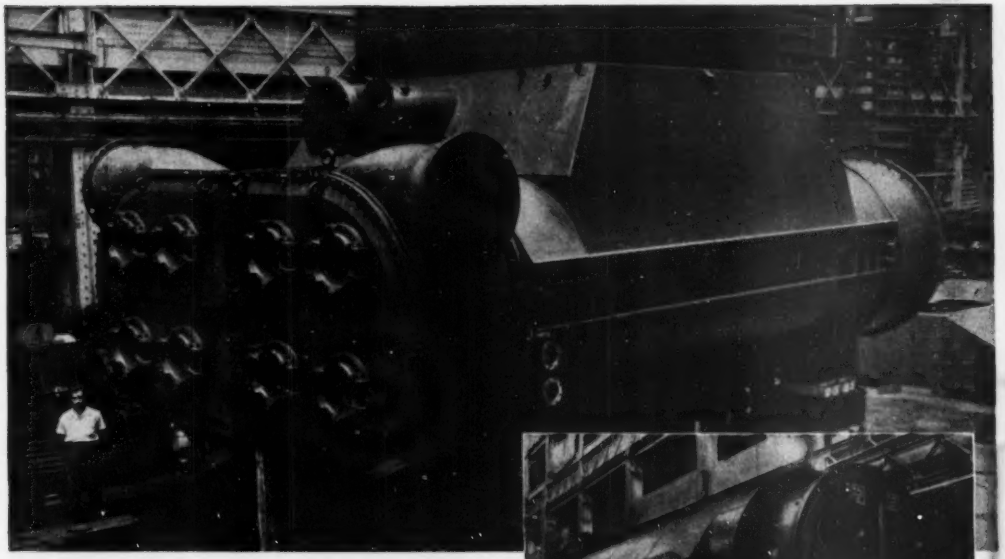
Take It Easy, Last Longer

RALPH J. CORDINER, president, General Electric Co, before the American Management Assoc at New York

The high mortality rate among our top officials is due primarily to their failure to delegate responsibility and work to qualified subordinates. This trend is the result of too much hurry and worry and as a consequence it is decreasing the age at which managers, carrying heavy responsibilities, are dying.

Worry is the realization of inadequacy, which is in itself a byproduct of lack of time to think through confidently to sound objectives and a good plan. Hurry is a parallel evidence of mismanagement of the specific and limited time available to the individual manager.

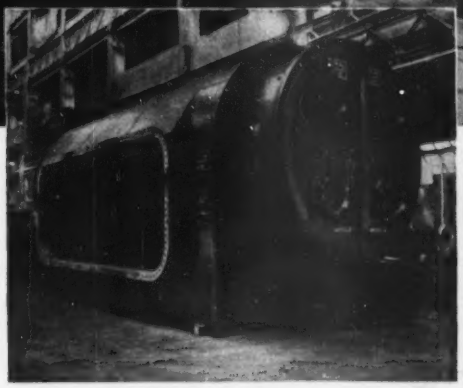
Management should be decentralized and the heads of segments should have full authority as well as responsibility. These decentralized corporations must, however, be staffed by competent executives without exception.



LOW-HEADROOM, OVAL-TYPE CONDENSER (with extraction heater in exhaust neck), is typical of several furnished in sizes ranging from 27,500 to 80,000 sq. ft.

"TAILORED TO FIT"

Low-headroom design for condensers typical of Worthington "space" engineering



SIDE INLET CONDENSER, one-half of several "twin shell" units serving turbine-generators of 20,000 to 100,000 kw.

It all began in 1854.

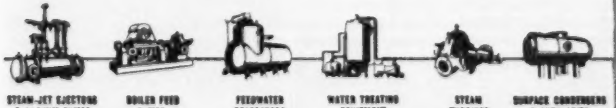
That was the year the first Worthington condenser was installed. From that time, up through the early twentieth-century "evolutionary" period in condenser design, Worthington has constantly kept in step with prime mover and steam power plant development. Today, engineers must design and build condensers within the limitations imposed by high construction costs.

Thanks to the flexible nature of the Worthington "Double Folded Tube Layer", today's "low-headroom" requirements are easily met without any sacrifice in efficiency. For single-shell, beneath-turbine installations, the rectangular box-type (built by Worthington as early as 1904) has given way to the modern "oval" design illustrated above. Other designs include single-shell, side-mounted units with exhaust elbows, and twin shells with horizontal or "T" shaped exhaust connections, popular for outdoor or semi-outdoor plants.

As the capacity of turbine-generators increases, so does the demand for larger condensers. This places more importance on "space" engineering. Worthington—with over a century of experience in the manufacture of steam power equipment—is prepared to build efficient condensers in all sizes to suit any reasonable limitations. (Now under construction for an eastern utility is the largest single-shell unit ever ordered—125,000 sq. ft.)

Write for advice on your new installation, stating requirements. Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Steam Power Division, Harrison, N. J.

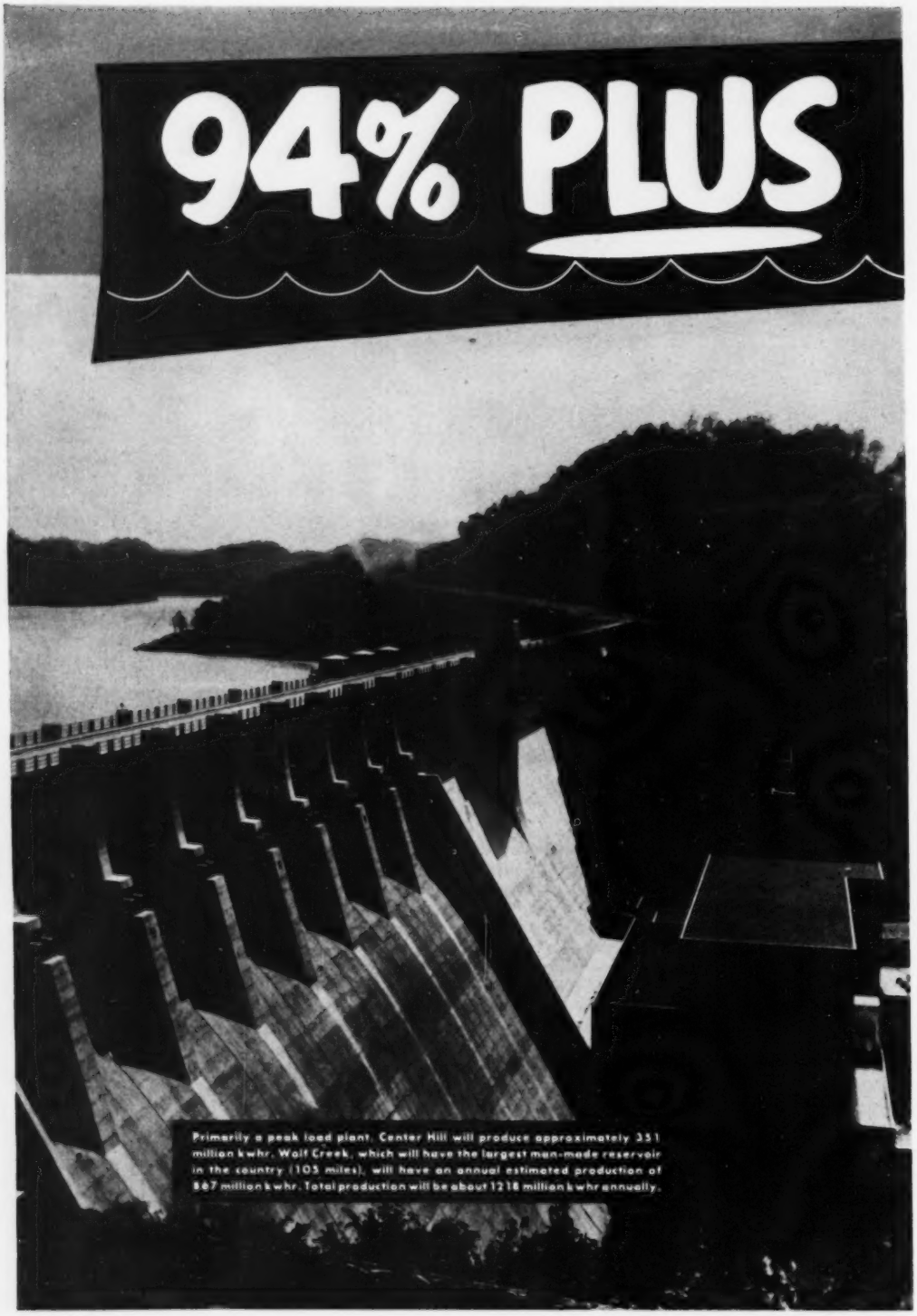
Z-2-1



A GREAT TEAM IN STEAM

WORTHINGTON

Condensers



Primarily a peak load plant, Center Hill will produce approximately 351 million kwhr. Wolf Creek, which will have the largest man-made reservoir in the country (105 miles), will have an annual estimated production of 867 million kwhr. Total production will be about 1218 million kwhr annually.

EFFICIENCY

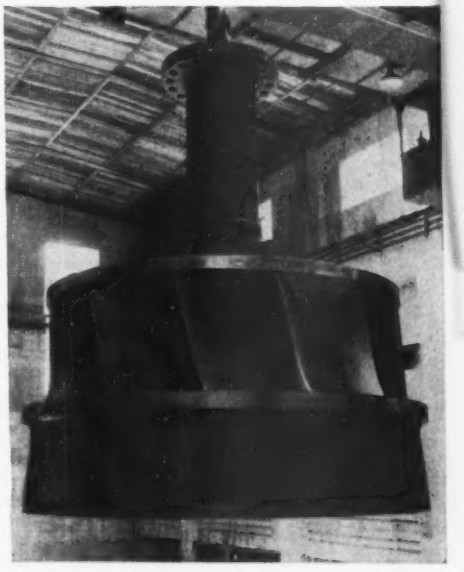
. . . for the BALDWIN turbines at Wolf Creek and Center Hill

Key units in the Corps of Engineers' plans to develop the resources of the Cumberland River Valley are Wolf Creek and Center Hill Dams. Together they will have a combined storage capacity of 8,000,000 acre-feet—generate about 1218 million kwhr each year.

To produce this power, nine Baldwin-built turbines are being installed—six at Wolf Creek and three at Center Hill. And based on early test runs, they will play an important role in making these two hydro-electric plants among the most efficient in the country.

During acceptance tests, for instance, Turbine No. 2 at Center Hill has shown a maximum attained efficiency (at normal synchronous speed and 160 foot head) of 94%+ . . . one of the best efficiencies ever obtained for Francis-type units. Since all turbines are identical, overall plant efficiencies are expected to be excellent.

Whatever your hydro-electric project, Baldwin Engineers will be glad to put their experience and resources at your service to help you get the high efficiencies you want. Experienced with all the four basic types of turbines—Impulse, Propeller, Francis and adjustable blade (Kaplan)—they can give you an unbiased opinion of the type best suited to your flow and head conditions.



One piece 127,200 lb., 186⅞ in. runner for the Baldwin 62,500 hp vertical Francis-type turbines for Center Hill and Wolf Creek Dams.

Baldwin-Lima-Hamilton Corporation, Eddystone Division, Philadelphia 42, Pa.

BALDWIN-LIMA-HAMILTON

Pelton Water Wheel Company, 2929 Nineteenth St., San Francisco 10, Calif.

NEWS ABOUT PEOPLE

Torchio Named Commercial VP

New official of American G&E Service Corp comes from Ohio Power, where he served as assistant general manager

PHILIP TORCHIO, JR

Philip Torchio, Jr, has been appointed commercial vice president of American Gas & Electric Service Corp. Before this appointment, he was an assistant general manager and a director of Ohio Power Co, an operating subsidiary of American Gas & Electric Co.

As commercial vice president, Torchio will succeed Harold M. Sawyer, who is retiring Oct. 1 after 41 years' service.

An MIT Graduate . . . Torchio, who graduated from Massachusetts Institute of Technology in 1930, joined American G&E's service corporation in 1948 as assistant to the operating vice president. He was named assistant to the general manager of Ohio Power in 1949 and assistant general manager in 1951.

Prior to joining the service corporation, he had been associated with Consolidated Edison Co of New York, Inc, for 15 years. During World War II he served three years with the Navy's amphibious forces.

Sawyer, who graduated from Cornell University in 1911, was a general contract agent for American G&E before he was elected to the post of vice president for the service corporation in 1928.

Was Head of AEIC . . . Before joining American G&E Sawyer was first affiliated with Scranton Electric Co, a subsidiary, as a junior power engineer. Later he became associated with Wheeling Electric Co, another subsidiary, as a power engineer. The retiring official also served as president of the Association of Edison Illuminating Companies in 1939.

Personnel Changes Made by Massachusetts Utility

The retirement of Waverly D. Packard as production superintendent for the Springfield area after 46 years' service in station operation with Western Massachusetts Electric Co brought about several personnel changes in the utility.

Peter C. Vogler has been made superintendent of steam production in that area and superintendent of the West Springfield plant. Russell D. Purrington is now assistant superintendent of the latter station.

Norman Wrigley has been named superintendent and Edward H. Armstrong assistant superintendent of the State Street station in Springfield. Joseph J. Trzcinski has been made assistant superintendent at Hampden steam plant.

Leon A. Allen has been appointed superintendent of electrical operations for the Springfield area, covering all electrical construction, operation, and maintenance of the company's generating plants and substations.

As new system superintendent of hydraulic operation, Joseph L. Hyland has charge of all operation, construction, and maintenance.

•

Embry S. Ferguson, for the past nine months assistant manager at Corsicana for Texas Power & Light Co, has been appointed district manager there. Ferguson has served the company 19 years.

J. W. Blake has been named state superintendent of generation for Oklahoma Gas & Electric Co to succeed the late Cecil C. Willis (EW, July 14 p 220). Blake, with the utility 16 years, will be in charge of all ten of Oklahoma G&E's state power plants. **A. W. Walton,** an electrical engineer in the generation department, was named Blake's assistant.

Chester M. Adams has been named general sales manager of Bridgeport Brass Co. **George H. Baldwin,** formerly sales manager, mill products, has been made assistant general sales manager and **Richard L. Allen** has been appointed sales manager of mill products for the firm's Bridgeport (Conn.) and Indianapolis (Ind.) plants.

WILLIAM R. HEROD

GE Appoints W. R. Herod Vice President in Merger

William Rogers Herod has been elected a vice president of General Electric Co.

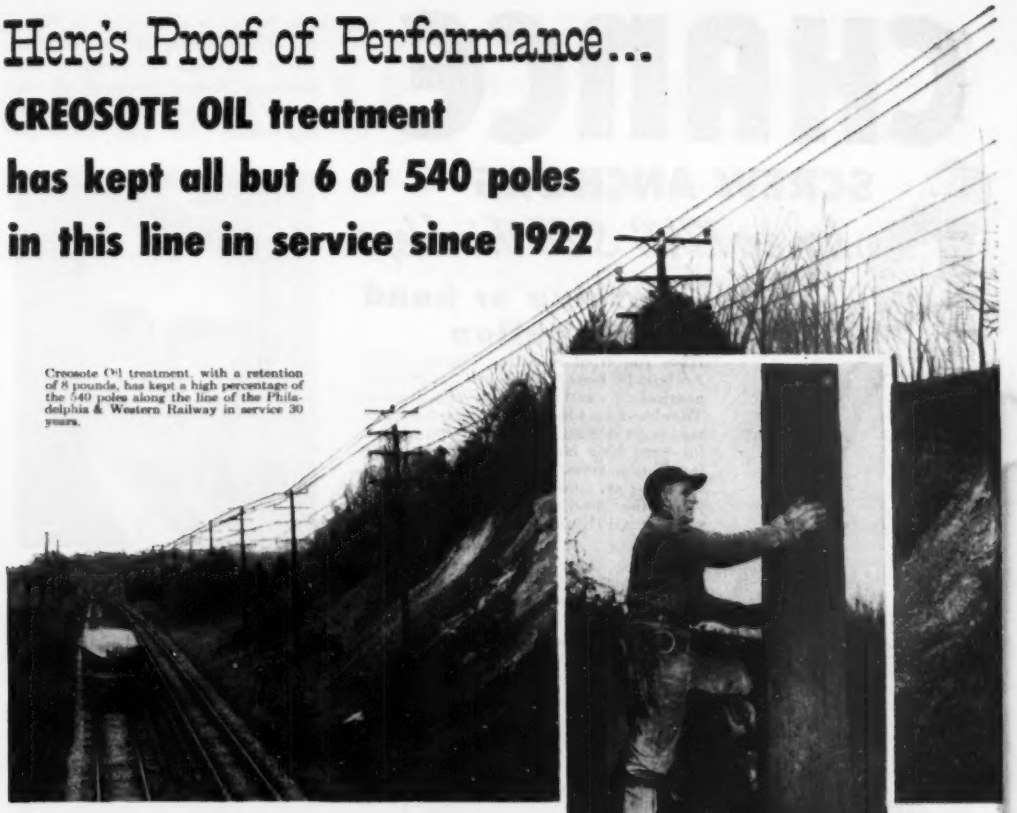
GE's new vice president will continue as president of the International General Electric Co, which he has headed since 1945. International, which has been a wholly owned affiliate of GE since 1919, has been merged with and has become a division of General Electric.

Joining GE in Schenectady in 1919, he later was made special assistant in the construction-engineering department. In 1929 he was transferred to IGE. From 1934 to 1937 he was assistant to the managing director of Associated Electrical Industries in London, and in 1937 returned to New York as vice president of IGE.

Upon his return to IGE in 1945

Here's Proof of Performance...

CREOSOTE OIL treatment has kept all but 6 of 540 poles in this line in service since 1922



Creosote Oil treatment, with a retention of 8 pounds, has kept a high percentage of the 540 poles along the line of the Philadelphia & Western Railway in service 30 years.

Lineman Henry Daub of the Philadelphia Electric Company prepares to climb a pole on the line he helped to erect in 1922.

IN 1922, the Philadelphia Electric Company erected this 540-pole line along the tracks of the Philadelphia and Western Railway between Norristown and Llanerch, Pa. The Southern pine poles were given an 8-pound pressure treatment with Creosote Oil.

In 1940, the 376 poles on the Main Line—between Llanerch and Matsons Ford Road—were inspected. Two poles were removed due to decay, and three were moved for relocation. The next year, one pole was found decayed on the Schuylkill Division—between Matsons Ford Road and Norristown—and six were relocated.

The third inspection, in 1951, led to removal of three more poles and the marking of 15 more for future replacement. Relocation affected one other pole. Future inspections are scheduled every three years, and most of the poles are expected to last at least another decade.

Let records like these be your best guide when you choose a wood preservative. They are real *proof of performance*. They are the main reason why the wood preserving industry is using Creosote Oil at the rate of more than 200 million gallons a year.

Creosote Oil contains not one but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

When you use treated wood, be sure it is pressure-treated with U·S·S Creosote Oil. It's the product of continuous processing in the world's largest tar distillation plant. For complete information, contact our nearest Coal Chemical Sales Office or write United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S CREOSOTE OIL

2-1413

UNITED STATES STEEL

CHANCE

SCREW ANCHORS

have a KING-SIZE Thimbleye

for machine or hand installation

Have you tried installing Chance Screw Anchors by machine? It's fast . . . it's economical . . . and it's simple—the oversize Thimbleye on Chance Screw Anchors will readily fit into an adapter that you can get for your hole boring machine. Machine installation saves many costly man hours on big line construction jobs and also solves the installation problem in areas where it is difficult to install screw anchors by hand.

This same "king-size" Thimbleye gives ample room to insert a turning bar big enough for extra leverage in hand installations.

ONE PIECE DOUBLE ARC WELDED ALL STEEL

Chance Screw Anchors consist of separately formed drop-forged steel Thimbleye anchor rods, and helixes with strong, sharp, structural steel blades that are double arc welded (top and bottom) to form an anchor that goes down fast and has exceptional holding power. Blades are correctly pitched to take the right "bite" into the earth for installation with a minimum of effort and earth disturbance. The single groove in the strand-protecting Thimbleye prevents overloading the anchor in regular installations, but a Tripleye rod, for two or three guy strands, is available at no extra cost for special jobs.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

CENTRALIA, MISSOURI

SAN FRANCISCO, CALIFORNIA

You should have a copy of "How Much will an Anchor Hold?" This Chance formula tells what type and kind of anchor to use for every guying condition. Write for your copy today.

C32-8

after serving as a colonel in the Army Air Force during World War II, Herod was made an executive vice president. Shortly thereafter he was elected a president and director of the organization.

B. M. DAVIS

Mississippi P&L Elevates B. M. Davis to New Post

B. M. Davis, formerly industrial and commercial sales manager of Mississippi Power & Light Co, has been named general sales manager.

Since joining Mississippi P&L's sales department in 1934, Davis has filled a number of executive positions. His first assignment was as an industrial sales engineer in which post he was engaged in industrial development work. Then he was promoted to sales promotion and advertising manager. Later he was made industrial sales manager and then commercial and industrial sales manager, the position he held until his recent appointment.

Prior to his association with Mississippi P&L, Davis was a sales engineer with General Electric Co for nine years.

Davis is a member of the Illuminating Engineering Society, a vice chairman of the industrial committee of the Southeastern Electrical Exchange, and a member of the street lighting co-ordinating committee of Edison Electric Institute.

•

Dr Jerome B. Wiesner, professor of electrical engineering at Massachusetts Institute of Technology, has been named director of the M. I. T. elec-

(*Continued on page* 202)

Go by these plain, hard Facts . . . and SAVE!

CHEVROLET Advance-Design TRUCKS

Fact No. 1

Saves you money on purchase

Check the price on a Chevrolet truck that's the right size, type and capacity to handle your work. You're going to find that this Chevrolet truck lists for less than any other make of truck capable of doing the job. Here's an immediate, cash saving.

Fact No. 2

Cuts operating costs

Day in, day out a Chevrolet truck works for rock-bottom "wages" on fuel and upkeep. It brings you the proved economy of Valve-in-Head engine, with 4-Way Lubrication to reduce engine wear. Extra-rugged features cut maintenance costs.

Fact No. 3

Gives you the right truck for the job

Chevrolet trucks are factory-matched to the job—tires, axles, frame, springs, engine, transmission, brakes. It's the Chevrolet idea to provide you with exactly as much truck as you need and no more. Chevrolet truck users know this idea pays off.

Fact No. 4

Saves money on trade-in

It's right in the records that Chevrolet trucks traditionally bring more money on the used truck market—and that can mean more money for you when you trade or sell. There's another reason why more truck users choose Chevrolet than any other make.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

CHEVROLET first in demand in value in sales

Smoke test proves new lamp stays bright!

DIMMED BY FILM

The film from dirt, smoke and soot had lowered the light output of the conventional lamp and its reflector by 56%.

STAYS BRIGHT

The new Westinghouse R-57 lamp, with its built-in reflector, had lost only 15% of its light output!

TESTED BY DIESEL SMOKE AND SOOT

Diesel engines belch oily smoke into the air. That's why a diesel engine roundhouse was chosen to test a conventional lamp with reflector, and a Westinghouse R-57.

Before the test, the light output of the lamp in reflector, and the R-57 were measured in a photometer. After hanging for one month in the high bay of the roundhouse, they were returned to the Westinghouse laboratories for another photometric reading.

YOU CAN BE SURE... IF IT'S

Westinghouse

You know the need, the advantages of good lighting in your plant. To keep the light level high, lamps and their reflectors must be cleaned. This is costly. Now Westinghouse solves both problems with its new R-57 lamp. Its built-in reflector is sealed against dirt, dust, and soot.

The Westinghouse R-57 saves cleaning costs. And every time you replace an R-57, you add a new, silvery reflector to your installation.

The Westinghouse R-57 550- or 800-watt comes with wide or narrow beam and will fit your standard sockets. And, it has a rated average life of 2000 hours! For more information, just mail coupon, or call your nearest Westinghouse Lamp Sales Office.

TUNE IN ON HISTORY! Only Westinghouse brings you complete coverage of political campaign over CBS television and radio.

WESTINGHOUSE LAMP DIVISION Dept. EW
Bloomfield, New Jersey

I'd like more information about the new Westinghouse 550- and 800-watt R-57 lamps.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

MORE THAN MEETS YOUR EYE

by Sam Hibben

LIGHT IS THE STAFF OF LIFE. Without sunlight, there would be no plant life, no food for animals. Light enables the green leaf to take carbon dioxide from the air and make plant tissue. The magic worker in all green plants is "chlorophyll," (which means *green leaf*). It exists in a thin skin around the earth—about fifty feet below the ocean's surface, to some three miles above it. Light and chlorophyll create the "bread" by which we all live. Strange, isn't it, that man has never learned to make the chlorophyll that makes his own life possible.

LIGHT IS AS INVISIBLE AS THE WIND. What we see is not light, but the objects that intercept or reflect light waves. And if objects did not break light down and send us portions of the spectrum, we would not know color. Ever think about the peculiar structural differences that make the red rose petals reflect light so differently from the white lily, or the blue violet?

BALANCING THE SPECTRUM. Mercury lamps are very efficient sources of light. But they give a greenish light, and are often paired with incandescents for color correction. Since the latter do not last as long, the labor cost of replacing them lowers the economy of mercury lighting. To correct this, Westinghouse balanced the mercury spectrum. The ultra-violet, normally wasted on the inside of mercury lamps, was simply put to work. In the new Westinghouse 1000-watt C-H12, and the 400-watt J-H1, the ultra-violet causes a special phosphor coating inside the bulb to fluoresce red. The light from the phosphor and the mercury vapor blend into a golden-white light of great efficiency.

More next month.

Samuel G. Hibben

BUY NOW AND SAVE!
WESTINGHOUSE
FLUORESCENT LAMPS
STILL COST YOU LESS
THAN THEY DID
IN 1940, YET BURN
SEVEN TIMES LONGER!

● For styles may come and styles may go, but Koppers Poles go on and on.

Koppers Poles are famous for the way they last; for the way they give decades of dependable service; for the way they make line operation easier and more economical.

It will pay you to specify Koppers Full-Length Pressure-Creosoted Poles. You'll get the kind of pole service you like.

KOPPERS COMPANY, INC. PITTSBURGH 19, PA.

KOPPERS PRESSURE-CREOSOTED WOOD

(*Continued from page* 198)

tronics research laboratory. He succeeds **Prof Albert G. Hill,** on leave of absence from the physics department, who has been made director of Lincoln Laboratory, an M. I. T. electronic research project.

McDaniel, Strickland Named VPs by Hotpoint

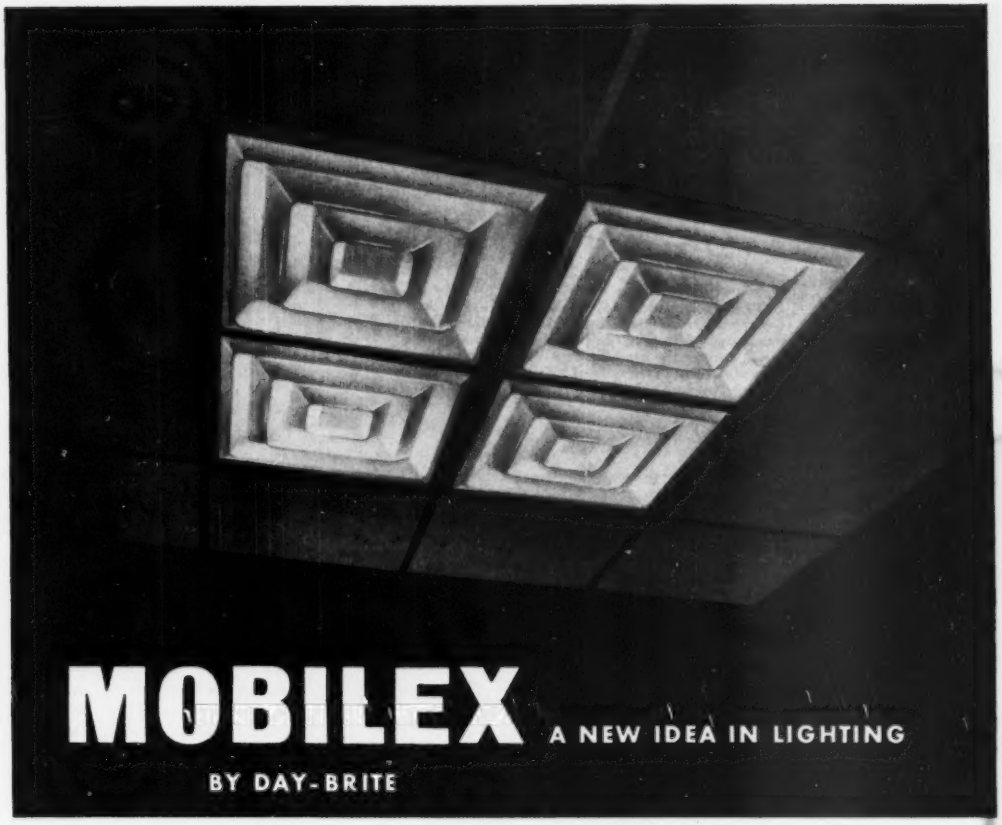
John F. McDaniel has been promoted to the position of vice president and manager of marketing by

JOHN F. McDANIEL

HAROLD A. STRICKLAND

Hotpoint, Inc., Chicago. The company also elected Harold A. Strickland, Jr, vice president and manager of engineering.

In his new post McDaniel will direct all company marketing activities. Strickland now will direct all engineering functions for Hotpoint's complete line of products for all-electric kitchens and automatic home laundries, including research and product development. (*Continued next page*)



MOBILEX

A NEW IDEA IN LIGHTING

BY DAY-BRITE

MOBILEX introduces a new, flexible recessed lighting system designed for use as an integral part of the newly developed grid-type suspended ceiling which consists of interlocking "tees" supporting Fiberglas* Ceiling Boards.

MOBILEX is available in 2′ x 2′ units for two, three or four 20-watt fluorescent lamps and in 2′ x 4′ units for two, three or four 40-watt fluorescent lamps. RAPID-SMOOTH START ballasts are standard on all 40-watt units.

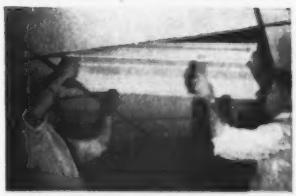
Three shielding elements provide a variety of pleasing patterns. Moulded plastic (illustrated above), Skytex glass, and Boxco (R) louvered frames are interchangeable and hinge from either side for easy servicing.

MOBILEX is extremely flexible. Units may be used singly, end to end, or side by side . . . and in any combination. A wealth of interesting patterns is possible.

Installation is simple. Compress the sides of the fixture to clear ceiling rails. Insert the fixture into the grid opening and let it rest on the rails. End baffles lock the compression feature in place. Make electrical connections, add hinged shielding frame and installation is complete.

MOBILEX is new, practical and competitively priced. Here's a perfect answer for those tough remodeling jobs and new projects with a limited budget. Get the full MOBILEX story. Write for Bulletin OD-567—today.

*Fiberglas is the trade mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corp., Toledo, Ohio



ABOVE: Easy to install. Simply compress the sides of the fixture and insert it into the grid opening.

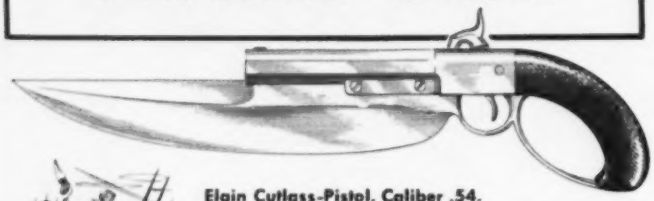
BELOW: No hangers or suspension straps. Fixture rests on grid rails. Fixtures can be added or changed at any time.

277

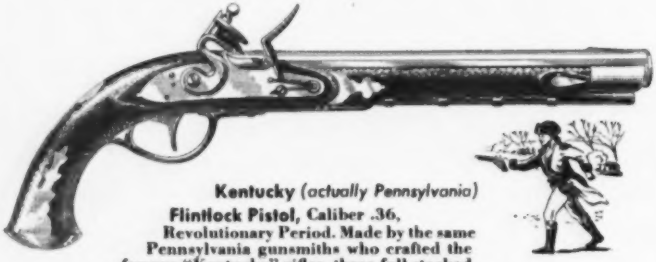
"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5417 Bulwer Ave., St. Louis 7, Missouri
In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario

Famous Guns



Elgin Cutlass-Pistol, Caliber .54,
1837 Model, made by C. B. Allen. Invented by George Elgin of New York, this formidable arm was intended to take the place of the cutlass and pistol commonly used by naval boarding parties. One of several variations of this weapon is the shorter Bowie-Knife Pistol.



Kentucky *(actually Pennsylvania)*
Flintlock Pistol, Caliber .36,
Revolutionary Period. Made by the same Pennsylvania gunsmiths who crafted the famous "Kentucky" rifles, these full-stocked pistols actually were rifles-in-miniature. Every "Kentucky" pistol is unique; the same gunsmith never made two alike.

Instant-heating
Weller Soldering Gun
for light or heavy work. Dual heat greatly increases tip life. Switch instantly to high or low heat as job requires. Pre-focused spotlights end "blind soldering". Exclusive tip-fastening arrangement assures full, constant heat. Shatter-proof plastic housing. Perfect balance. Low-cost, replaceable tips. Pays for itself in a few months. See at your Distributor or write for Bulletin direct.

Get SOLDERING TIPS, new Weller Handy Guide to faster, easier soldering. 20 pages fully illustrated. Price 10c at your Distributor, or order direct.

Weller BETTER FROM GRIP TO TIP!

SOLDERING GUNS 817 Packer Street, Easton, Pa.

The Finest Soldering Tool for the Finest Craftsmen

McDaniel, who recently was named manager of marketing (EW, June 2, p 140), has spent his entire business career with Hotpoint. Beginning in 1934, he has held positions in sales administration in all areas of the firm's business. In 1948 he became assistant sales manager, advancing to sales manager in 1951, and manager of marketing in 1952.

Strickland, recently appointed manager of engineering, joined Hotpoint in 1950 as executive engineer. Prior to this he was a chief executive engineer with a Detroit metal fabricating firm.

Templeton, Kenly & Co Elevates P. H. McManus

Templeton, Kenly & Co, Chicago, manufacturers of Simplex Jacks, has announced new promotions and additions to its sales staff.

Phillip H. McManus, formerly general sales manager, has been appointed vice president in charge of sales. In addition to directing sales, McManus will travel in the far western territory. A new member of the staff, William H. Zepp, will assist McManus in the states of Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, and Wisconsin.

N. L. Montgomery has been named manager of mining sales in southern Indiana, southern Ohio, Kentucky, Pennsylvania, West Virginia, and Virginia. He will be assisted by a new salesman, Richard S. Bowers.

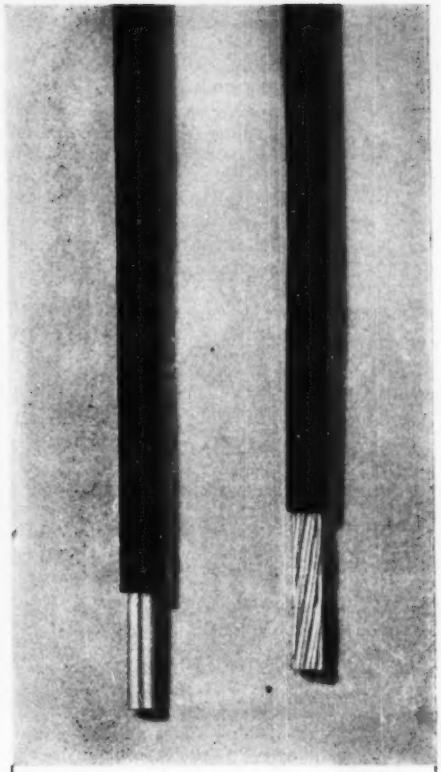
William D. Boldt, southeastern division sales manager, with headquarters at Atlanta, Ga., has been assigned the states of Arkansas and Louisiana in addition to his former territory of Alabama, Georgia, Florida, Mississippi, Tennessee, North Carolina, and South Carolina.

Arthur C. Templeton, whose headquarters are at Dallas, Tex, will cover Oklahoma and Texas.

•

Jack W. Summitt has been named to the newly created post of public utilities field engineer for the Florida Railroad Commission.

Clarence B. Johnson, substation and underground maintenance engineer of the Electric Power Board of Chattanooga, Tenn., has been advanced to the post of general service engineer. His successor is **John S. McQueen.** Johnson was with Alabama Power Co



Listed below are sizes of Kaiser Aluminum Neoprene Conductor that meet the standards of REA at this time:

#6 Solid All-aluminum	3/64" Neoprene Covering
#4 Solid All-aluminum	3/64" Neoprene Covering
#2 Solid All-aluminum	3/64" Neoprene Covering
#4-7 Strand All-aluminum	3/64" Neoprene Covering
#2-7 Strand All-aluminum	3/64" Neoprene Covering
#1-7 Strand All-aluminum	4/64" Neoprene Covering
#1/0-7 Strand All-aluminum	4/64" Neoprene Covering
#3/0-7 Strand All-aluminum	4/64" Neoprene Covering

Also Kaiser Aluminum Triplex Cable

Kaiser Aluminum weatherproof conductor gains in nationwide popularity

Proof of the growing acceptance of Kaiser Aluminum Weatherproof Conductor is its increasing usage for service drops and secondary distribution lines all over the country.

For example, during the past year, both *stranded* and *solid* Kaiser Aluminum Neoprene covered weatherproof conductors were accepted by REA. And acceptance of the stranded type was the *first* given to any manufacturer.

Discover the advantages of using Kaiser Aluminum weatherproof conductor. You'll find that it gives long, trouble-free service—that it cuts costs up to 25%.

Accessories and fittings for Kaiser Aluminum conductors are available from leading manufacturers.

ACT NOW! Give immediate consideration to the savings and advantages of Kaiser Aluminum Weatherproof Conductor on your next job. Send for free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable. Call or write any Kaiser Aluminum office in principal cities, or our many distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

Setting the pace . . . through quality and service

before joining EPB in 1940. McQueen came to the board in 1941.

G. South Dunn, who left Appalachian Electric Power Co last February to assume a new position in Chicago, has returned to his former post—public relations director of AEPCo. Dunn had been with AEPCo for 26 years before becoming assistant to the president of Curtis Lighting, Inc, manufacturers of commercial and industrial lighting.

Jay M. Sharp has been named advertising promotion manager of Aluminum Co of America.

OBITUARY

Thomas Cruthers, vice president of Worthington Corp since 1936, died at West Orange, N. J., July 27. Cruthers came to Worthington in 1907. From 1925 to 1929 he successively held the positions of sales engineer, assistant sales manager, and sales manager in the New York office. After serving as assistant general sales manager for several years, he was made an assistant vice president in the general sales department in 1932.

Arthur Laurie Abbott, 79, an electrical engineer, died July 26 at Hackensack, N. J. He had been technical advisor to the uniform legislation department of National Electrical Manufacturers Association since 1928. Abbott, previously technical director of Electragist Association, now National Electrical Contractors' Association, was author of the National Electrical Code Handbook.

Caxton Brown, 72, retired president of Weston Electrical Instrument Corp, Newark, N. J., died at Summit, N. J. July 25. Brown, who joined the firm in 1901, was elected vice president in 1939, president in 1944, and chairman of the executive committee in 1947, retiring from this post in 1950.

Lammot du Pont, 71, former president and board chairman of E. I du Pont de Nemours & Co, died July 24 at Wilmington, Del. He had served as president between 1926 and 1940, at which time he resigned to become chairman of the board. He retired as board chairman in 1948.

Brush control that's *right on the line!*

Brush control along thousands of miles of power and communication lines is a big job—one that calls for the best brush-killing chemicals available. Good results on many species of brush in all sections of the country at all seasons of the year have proved that Esteron* Brush Killer and Esteron 245 should be first choice in planning a successful brush control program.

Both contain the new, highly effective low-volatility propylene glycol butyl ether esters. Esteron Brush Killer, a mixture of the 2,4-D and 2,4,5-T esters, is widely used for control of mixed stands of brush. Esteron 245 gives poison ivy and other 2,4-D resistant woody species a straight dose of 2,4,5-T. This product also is recommended for year-around stump treatment and basal bark application. Both Esteron Brush Killer and Esteron 245 have excellent storage qualities.

For brush control that's *right on the line*—pick the right brush killer, use it right and at the right time. You are invited to call on Dow sales and technical men for consultation on your brush control problems.

*Esteron is a registered trade mark of The Dow Chemical Company, largest producers of weed, brush and grass control chemicals.

Esteron Brush Killer and Esteron 245

Containing new low-volatility esters

THE DOW CHEMICAL COMPANY

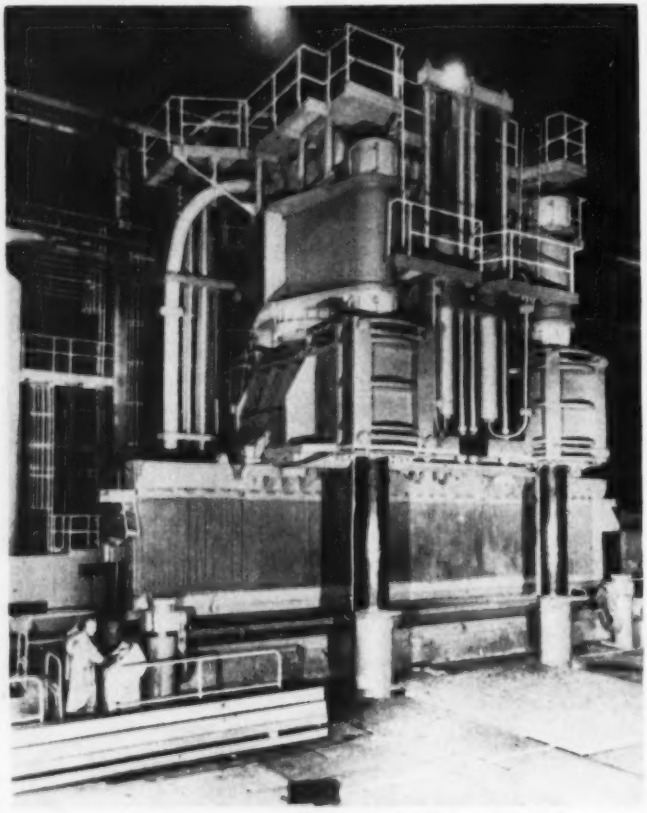
Agricultural Chemical Department • Midland, Michigan

New York • Boston • Philadelphia • Atlanta • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE



HEAVY PLATE BENDING is done on the vertical hydraulic press recently installed at Babcock & Wilcox's Boiler Division works at Barberton, Ohio. Operator (left) at push-button control board moves a 6-in. steel plate, located in bed of press, in arc with hooklike manipulators

Adds $2.5 Million Press, Bench

Babcock & Wilcox sets up units in its Barberton plant. Equipment bends heavy boiler plate, makes hollow forgings

Newest additions to Babcock & Wilcox Co's facilities are the $2.5-million vertical hydraulic press and horizontal draw bench recently installed at the Boiler Division works at Barberton, Ohio.

Part of $30-Million Program . . . This installation, the largest single investment in the history of the plant, is part of B&W's $30-million expansion program to keep its productive facilities in balance with the nation's growing demands for electricity. B&W's expansion, rebuilding, and replacement program for its plants throughout the country was launched shortly after World War II.

The press will bend heavy plate for boiler drums and also will be used to pierce ingots which will then be transferred to the draw bench to be formed into hollow forgings for boiler headers and other special parts.

Housed in a building 105 by 275 ft and 92 ft high, the press and draw bench, operated by push-button control, were built of heavy welded steel plate. To operate the equipment a complete hydropneumatic pressure system was installed by Babcock & Wilcox.

Built at Barberton . . . The vertical hydraulic press, built practically in its entirety in the Barberton shops, has as supporting columns four steel pillars 52 ft high and 26 in. in diameter, each weighing 41 tons. Largest of the three press platens—welded structures made up of heavy steel plates—weighs 200 tons.

This press has a normal operation capacity of 6,500 tons or an intensified capacity of 8,500 tons. Operating pressure is 3,000 psi. It has a daylight of 20 ft and an operating stroke of 9 ft 6 in. It is equipped with bending beams 42 ft long, and its open-ended design makes it possible to bend even longer plates. It is 64 ft in overall height from the bottom of the pit in which it stands.

Save Time, Cost . . . Boiler drums for high-duty central station units are fabricated by welding together a number of sections formed from heavy plate. A longer plate means there will be fewer circumferential welds with a subsequent saving in time and cost.

B&W's new horizontal draw bench is utilized for forming hollow forgings and has a 1,200-ton rating. Return stroke is operated at 600 tons and pressures of either 600 or 1,200 tons can be selected for the forward stroke which is 30 ft in length. The unit has an overall length of 114 ft.

In addition to forming heavy drum plate, the press also is used to pierce or force an opening, lengthwise, into a heated ingot. The hollow ingot is then drawn through a series of ring dies over a mandrel on the draw bench to form a rough hollow forging in a few minutes.

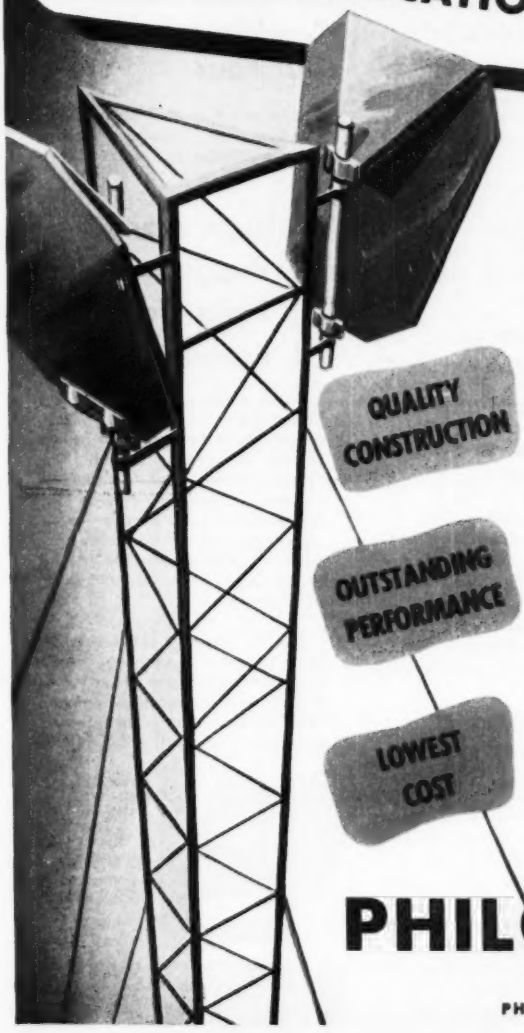
Seamless hollow forgings will be produced by this new equipment from a minimum of 8 in. inside diameter and ¾-in. wall thickness, up to a maximum inside diameter of 26 in. and a wall thickness of 4½ in. in lengths up to 22 ft.

Magic Touch . . . Both the press and bench have push-button control. A light touch of the finger on a push-button can control the movement of a heavy steel plate on the press to the precision of 1/16 to 1/32 of an inch (see photo). There are four control boards making it easy for the operator to work at either end and

DON'T SETTLE FOR LESS!

PHILCO

Advanced Design MICROWAVE COMMUNICATIONS SYSTEMS



QUALITY CONSTRUCTION

OUTSTANDING PERFORMANCE

LOWEST COST

Again Philco leads the way . . . with Philco *Advanced Design* Microwave Communications Systems. Philco's years of experience in microwave development has produced a system unsurpassed in reliability, performance and economy.

All components are of the finest quality, conservatively rated, insuring long life and economical operation and maintenance.

A signal level 1000 times greater than normally required insures dependable service even under the most adverse conditions. Philco *Advanced Design* Microwave is flexible. The broadband microwave channel may be divided to carry up to 24 simultaneous 2-way telephone conversations . . . or be further divided for telegraph, teletype, telemetering, signaling or supervisory circuits.

Years of production experience enable Philco to produce microwave systems for the lowest possible cost consistent with highest quality. Future expansion can be easily accomplished with no loss of original investment.

For dependable communications service 24 hours a day, every day of the year . . . *don't settle for less* than Philco *Advanced Design* Microwave Communications Systems!

PHILCO CORPORATION

INDUSTRIAL DIVISION

PHILADELPHIA 34, PENNSYLVANIA

TAILOR-MAKE YOUR OWN

CONDUIT OR PIPE BENDS

RIGHT ON THE JOB

...simple, quick with the

GREENLEE HYDRAULIC BENDER

Yes, quickly make bends *exactly* as you want them, when you want them, where you want them. Compact, portable GREENLEE Hydraulic Pipe and Conduit Bender lets you do this in a jiffy. *One-man operated* to produce smooth, accurate bends in just a few minutes . . . in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Owners report timesavings up to 60% and more, elimination of cost for manufactured bends and fittings, and "clean", tailor-made installations every time. Get facts now on this time-saving tool that often pays for itself on first few jobs! Write for free Bender Booklet, Greenlee Tool Co., 1808 Columbia Avenue, Rockford, Illinois.

GREENLEE

Other GREENLEE timesaving tools for electrical work: Hand Benders; Joist Borers; Cable Pullers; Knockout Tools; Auger Bits and Drills.

watch the movements of the plate to be bent. A master panel in turn controls four manipulators which lift and turn the plate with fingerlike delicacy. Remote selsyn control guides the rise and fall of the press platen.

The draw bench has one large control panel which directs the varied movements of its parts and, by remote control draws on the hydropneumatic pressure system.

The hydropneumatic power equipment is located in an addition to the company's main power plant. Electric power for the operation of the Barberton works is purchased from Ohio Edison Co.

General Electric's Sales Dip 1% in 1st Half of '52

General Electric Co's sales during the first six months of this year amounted to $1,171,202,000, which is 1% less than the record level of $1,184,735,000 reached in the first half of 1951.

Sales for the second quarter of 1952 totaled $610,645,000 compared with $615,047,000 during the second quarter of last year.

Net income for the first half of 1952 was $57,119,000, equal to $1.98 per share of common stock issued. This is a decrease of 19% from the net income for the first half of 1951 of $70,326,000, equal to $2.44 per share of common stock. Net income for the second quarter of 1952 was $28,095,000, equal to 97¢ per share of common stock issued.

Provision for federal income and excess profits taxes for the first six months of 1952 amounted to $122,500,000 compared with federal taxes of $142,000,000 in the first half of 1951. For the second quarter of 1952, federal income and excess profits taxes totaled $60 million.

Allis-Chalmers Announces Gains for 1st Half of '52

Allis-Chalmers Manufacturing Co's sales for the first six months of 1952 were $267,141,887 compared with $208,199,919 for the same period a year ago. Sales for the second quarter of 1952 totaled $144,042,272.

Net income for the first half of 1952 was $11,510,307, equal to $4.05 per share on 2,720,743 shares of common stock outstanding. Net in-

Combines All Four

EVERY requisite that sound construction needs demand are combined in *Crapo* Galvanized Steel Strand—

1. High strength
2. Ruggedness
3. Long life
4. Economy

The superior tensile strength inherent in steel is utilized to fullest advantage in each size and grade of this time-proved strand. The heavy, ductile, tightly-adherent galvanized coating—applied by the famous *Crapo* process—provides dependable protection to the steel, extends the life of the strand beyond the normal period of replacement.

Specify *Crapo* Galvanized Steel Strand for guys, messenger and overhead ground wires! There is a size and grade for every practical need available for prompt shipment.

ASK YOUR JOBBER!

Consult your nearest distributor of *Crapo* Products or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE INDIANA

Where Does the Light Go ?

A lamp bulb yields a definite amount of light, according to its design characteristics. It can't be made to give more light without shortening its life, or incurring some other loss.

The important thing is to direct and control light properly, thus minimizing waste. This may be accomplished by scientific engineering, which is the basis of lighting progress.

In order to improve their products, and thus to promote sales, manufacturers of lighting equipment designed to direct and control light must depend upon reliable tests. ETL tests provide the means of determining the needed facts in an independent, well equipped laboratory.

ETL has no opinions or preferences. It employs competent engineers and technicians to conduct tests and renders impartial reports of the results in the lighting field. Its clients, since 1896 include manufacturers of light sources, lighting fixtures, auxiliary equipment, portables and the like. Testing may be undertaken for individual manufacturers or groups.

ETL certification is the cornerstone of such group activities of national scope as "R.L.M.", "Fleur-O-Lier", "Certified Lamp", "Certified Ballast" and "Certified Starter" Standards.

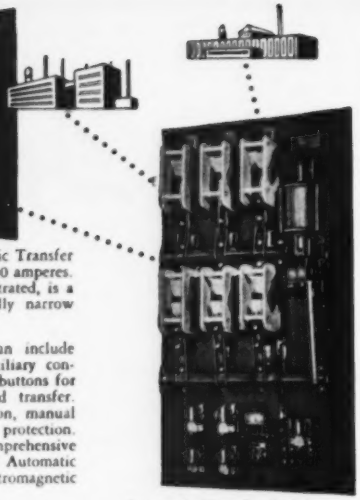
Of course ETL tests embrace many related fields — electrical, photometric, physical and chemical.

Know ETL by Test

ELECTRICAL TESTING LABORATORIES, INC.

2 EAST END AVENUE at 79th STREET
NEW YORK 21, N. Y.

HEADQUARTERS FOR
AUTOMATIC TRANSFER SWITCHES



We can take care of almost any Automatic Transfer Switch requirement ranging from 5 to 1000 amperes. For example, Bulletin 906-105S, as illustrated, is a 300 ampere unit installed in a specially narrow panel for a distribution control center.

Standard features on control panels can include phase failure protection, indicating auxiliary contacts, engine starting contacts and push buttons for engine tests, reset to normal and load transfer. Special features include delayed operation, manual emergency handles, low frequency relay protection. Condensed Catalog No. 700 gives a comprehensive picture of our work along the line of Automatic Transfer Switches and complete Electromagnetic Control Panels.

If you require any type of automatic control, write us. Our 60 odd years of broad experience in the field of Electromagnetic Controls should be helpful.

Automatic Transfer Switches
Remote Control Switches
Contactors Relays
Specialized Electromagnetic Controls

We also manufacture a complete line of Solenoid Operated Valves for Automatic and Remote Control of Liquids and Gases. B-50-3

AEC Electro-Magnetic CONTROLS

Automatic Switch Co.
397-E LAKESIDE AVENUE · ORANGE, NEW JERSEY

HIGHER QUALITY
AT LOWER COST!
with
BLACKBURN
Hi-Strength
Ground Rod Clamps
TYPE A
TYPE B
The complete line of clamps is cast of high-strength Duronze and uses Duronze set screws — truly high-strength construction throughout. Type A is a heavy clamp with floating pressure bar to align and protect the ground wire. Type B is the "Budget Line" clamp, but it makes a tight, trouble-free connection. For higher quality at lower cost, specify BLACKBURN.
JASPER BLACKBURN CORPORATION
35 MADISON ST. • ST. LOUIS 6, MO.
Phone CEntral 3007

come for the first half of 1951 was $10,672,694, equal to $4 per share on 2,518,639 shares of common stock then outstanding.

For the second quarter of 1952 net income was $6,291,733, equal to $2.20 per common share compared with second quarter net income of $6,092,939 in 1951, equal to $2.30 per common share.

Provision for federal income and excess profits taxes for the first six months of 1952 totaled $28.7 million, compared with the federal tax bill of $16,820,000 in the first half of last year.

MANUFACTURING BRIEFS

Westinghouse Electric Corp is building for Philadelphia Electric Co a 200,000-kw generator, which will utilize inner-cooling in both its rotor and stator. Inner cooling makes use of hollow generator conductors through which the hydrogen gas is passed. The unit is scheduled for shipment to the Cromby station in 1954. Reported to be the largest single-shaft unit ever built, the generator will bring the station's capacity to 350,000 kw.

General Electric Co has revealed that temporary shortages of its ranges, some refrigerators, freezers, automatic clothes washers, automatic dryers, and most water heater models may be expected as a result of the recent steel strike.

SALES ASSIGNMENTS

COMPANY STAFFS

BullDog Electric Products Co. Detroit, has named George Fassnacht Chicago district manager. He was transferred from the Columbus, Ohio, office, where he has worked as manager since 1951. His successor is Marcellus V. Kessler, former BullDog representative in Louisville, Ky.

A. O. Smith Corp. Milwaukee, has appointed John J. Redmon manager of its product service branch at Dallas, Tex., succeeding Ben Heald, who will do sales work for the firm. J. W. Rushing has been appointed assistant manager at Dallas.

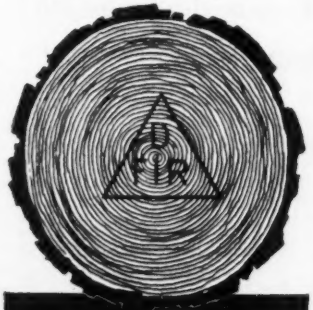
REPRESENTATIVES

Babcock & Wilcox Co's sales representative for the Tubular Products Division has opened new offices in the Goby Building, 1321 Bannock St., Denver, Colorado. David W. Jones, Jr, the representative, handles the division's complete line of seamless and welded, carbon, alloy and stainless steel tubing in the Rocky Mountain area.

FOR LONG LIFE and low service cost, the big 3 in western poles are Western Larch — Lodgepole Pine — Douglas Fir.

All 3 are grown on the virgin forest lands of the J. Neils Lumber Company in western Montana. All 3 are produced and treated in J. Neils modern pole plant at Libby, Montana.

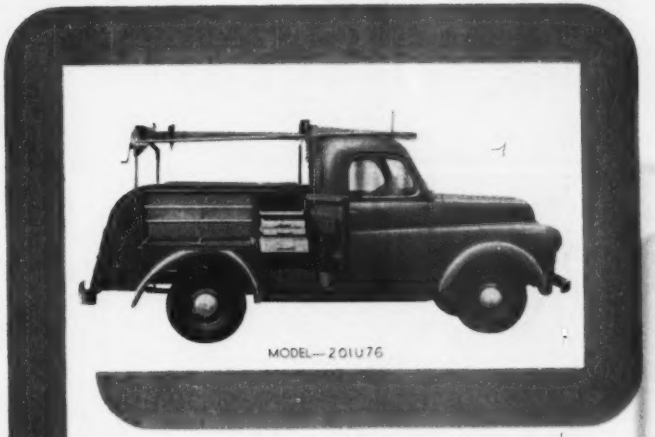
J. Neils Lumber Company, since 1895 a quality manufacturer of forest products, invites your inquiry on transmission and telephone poles. An illustrated folder on J. Neils treated poles, and information regarding their application to your own requirements, will be furnished on request.



POLE DIVISION
J. Neils
Lumber Company
Libby, Montana

YORK-HOOVER

60 YEAR POLICY PAYS OFF IN FASTER, BETTER SERVICE FOR YOU



OUR 60 YEAR POLICY . . .

Strict adherence to an iron clad policy established in 1892 . . . the policy of producing only quality merchandise at a fair price . . . at all times . . . and under any conceivable economic condition . . . pays off in faster, better service for you . . . for both light and heavy duty public utility operations.

HOW IT BENEFITS YOU . . .

Consistent with this policy . . . factors that contribute to the satisfaction of our customers are . . . engineering the body for the specific job to be done . . . meticulous attention to all metal fabricating details . . . plus strict adherence to rigid inspection standards.

CUSTOMER SATISFACTION . . .

You can rely with confidence on York-Hoover Truck Bodies because you not only get top quality workmanship, but enjoy lower maintenance costs and efficient performance at all times. For Public Utility Bodies that pay off in faster, better service for you . . . buy York-Hoover!

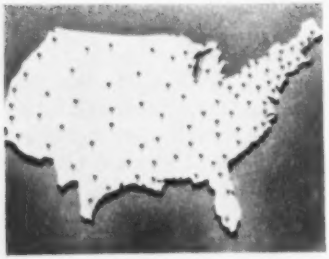
1952...OUR 60TH ANNIVERSARY YEAR

YORK-HOOVER CORPORATION
YORK, PENNSYLVANIA

Progress Report...

on General Electric's Home Light-Conditioning Program

After 20 months, nearly 100 Electric Service Companies tie-in, more than 3 million booklets distributed, a million people visit demonstration Light Conditioned homes



Nearly 100 electric service companies now sponsor Light Conditioning programs in their communities.

FOR many years the lighting and building industries have tried to raise the standards of lighting in America's homes. They made slow progress because they lacked basic specifications and a program that coordinated their efforts. Surveys showed that only one home in a hundred had lighting that filled the needs and desires of its inhabitants.

In December of 1950, General Electric's lighting experts provided the long-awaited tools to build an all-out, industry-wide effort. They created the now famous Light Conditioning recipes . . . a series of easy-to-follow instructions for properly lighting every room in a house. For the first time, homemakers had specific directions that showed the right lamp bulbs to use in the right fixtures in the right locations.

To sell Light Conditioning to the industry as well as the home owners, G-E's advertising and promotion specialists created colorful, full-page magazine ads, television and radio commercials, motion pictures, and display material. They published "See Your Home in a New Light"—a booklet containing the 22 lighting recipes—and planned tie-in promotions for local use.

From the beginning, Light Conditioning was a big success.

BETTER SERVICE BY ELECTRIC SERVICE COMPANIES

20 months after the first announcement of Light Conditioning, electric service companies throughout the country are now giving it their wholehearted support. They are distributing the lighting recipe booklet. They demonstrate Light Conditioning at churches, schools and before civic groups and promote it through newspapers, radio, television, billboards and store displays. Reports show they're being repaid many times over in better public relations and improved home use of electricity.

BUILDERS WELCOME IT TOO

Home builders were quick to see the extra salability that Light Conditioning adds to new homes. It gives them a distinctive feature that turns prospects into buyers. Last year, there were over 70 Light Conditioned demonstration homes during National Home Week. Over a million and a half home makers visited Light Conditioned homes in 1951. It's estimated that two million more will visit them in 1952.

OTHERS JOIN IN

Equipment manufacturers have brought out new and improved fixtures, valances and portable lamps to fill the Light Conditioning recipes. Wholesalers now employ specialists who devote full time to selling this Light Conditioning equipment. A sales training program for retail sales people is being co-sponsored by the National Retail Furniture Association and General Electric.

MOST SUCCESSFUL LIGHTING PROMOTION

Never before has the public accepted a lighting promotion so enthusiastically! A survey of 144,000 of the millions of families who have read the G-E Light Conditioning recipe booklet shows that 7 out of 10 used approximately 3½ Light Conditioning recipes at an average expenditure of $36 per family.

PLAN YOUR FALL LIGHT CONDITIONING PROGRAM NOW

To learn how you can tie in with Light Conditioning's national advertising and promotion, call your G-E lamp district office or write Lamp Division, General Electric, Dept. 166-EW-8, Nela Park, Cleveland 12, Ohio.

Over 2 million copies of this free Light Conditioning recipe booklet have been distributed to home owners and prospects.

In 1951, demonstration Light Conditioned homes, like the one above, attracted an average of 4,000 visitors.

General Electric's advertising features Light Conditioning on television programs (above), radio, and in magazines and newspapers.

You can put your confidence in—

GENERAL ELECTRIC

3E

INDOOR BUS SUPPORTS

prompt shipment
uniform high quality
easily altered or replaced

Fabrication from unit assemblies of components insure early delivery dates and uniform quality.

3E Bus Supports come in a wide range of styles and sizes for bar cable or tube conductors in flat or 1¼" pipe mounts, for voltages up to 23,000 volts.

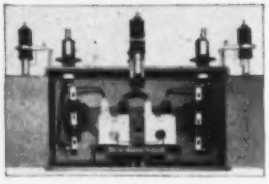
For full data ask for New Bulletin 226

ELECTRICAL ENGINEERS EQUIPMENT CO.
Melrose Park, Illinois

SUPERIOR SWITCHBOARD AND DEVICES • SERVING THE COUNTRY'S LEADING UTILITIES •

Check with Superior on

"IT" Enclosures



Full range of sizes in standard and top bushing types —all built to Superior's usual high quality. Write to:

SUPERIOR SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of
The Union Metal Manufacturing Company

New Electrical Construction

New electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included.

UTILITIES

Proposed Construction

Arizona-Nevada—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Araby, Ariz., transformers, equipment, etc. for Gila sub-station, DS 3760; equipment, etc. for Cochise Sub-station, Davis Dam Proj., Spec. DS 3761. L. N. McClellan, ch. engr.

California — Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Roseville, sub-stations, incl. switchgear assembly, transformers, bus ducts, etc. for Folsom Power Plant and Switchyard Folsom Unit, American River Div. Central Valley Proj. Spec. DS 3757. L. N. McClellan, ch. engr.

Calif., Bakersfield — Kern County Broadcasters, Inc., 4120 Truxton Ave., television station, $172,400. Craven, Lohnes & Culver, Munsey Bldg., Wash., D. C., consult. engrs.

Calif., Salinas — John H. Poole Broadcasting Co., Security Bldg., Long Beach, Zone 2, television station, $225,000. George P. Adair, 1833 M St. N. W., Wash., D. C., consult. engr.

Calif., Stockton—Radio Diablo, Inc., 798 San Mateo Ave., San Bruno, television station, $405,000.

Colorado—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, furnishing, del. f.o.b. cars shipping point or f.o.b. cars Loveland, switchboard cubicle and equip. for Flatiron Power Plant, and Flatiron Afterbay Dam, Colorado-Big Thompson Proj., Spec. DS 3759. L. N. McClellan, ch. engr.

Colo., Denver—Denver Television Co., 1621 Glenarm Pl., television station, $545,400. George C. Davis, Munsey Bldg., Wash., D. C., consult. engr.

Fla., Jacksonville — Jacksonville Broadcasting Co., Gulf Life Bldg., television station, $478,900. George C. Davis, Munsey Bldg., Wash., D. C., consult. engr.

Ga., Savannah—Savannah Broadcasting Co., P.O. Box 858, television station, $446,750. George C. Davis, Munsey Bldg., Wash. D. C., consult. engr.

Ill., Danville—Illinois Power Co., 134 E. Main St., Decatur, power plant, near here, $3,000,000. Sargent & Lundy, 140 S. Dearborn St., Chicago, Zone 3, consult. engrs.

Ill., Peoria—West Central Broadcasting c/o D. A. McGee, 306 N. Robinson St., Oklahoma City, Okla., television station, $518,580. McIntosh & Inglis, Wyatt Bldg., Wash., D. C., consult. engrs.

Ind., Indianapolis — Indianapolis Broadcasting, Inc., 307 N. Pennsylvania St., television station, $566,600. Craven, Lohnes & Culver, Munsey Bldg., Wash., D. C., consult. engrs.

Kan., Wichita—KAKE Broadcasting Co., 512 W. Douglas St., Zone 2, television station, $571,800. Craven, Lohnes & Culver, Munsey Bldg., Wash., D. C., consult. engrs.

Mich., Flint—WJR The Goodwill Station, Inc., Fisher Bldg., Detroit, television station, $1,172,500.

Mo., Columbia—University of Missouri, c/o Leslie Cowan, secy., Columbia, television station, $1,400,000. Craven, Lohnes & Culver, Munsey Bldg., Wash., D. C., consult. engrs.

Oklahoma—Indian Electric Co-operative, Cleveland, 108 mi. rural distr. lines, near Cleveland, Pawnee Co. $675,000. E. R. Taylor & Co., 4107 E.

How to keep informed on the "with what" part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information—advertising. You might call it the "with what" type—which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better—save your company money.

Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit you and your company, he is taking his most efficient way toward a sale.

Add up all the advertisers and you've got a gold mine of current, on-the-job information. Yours for the reading are a wealth of data and facts on the very latest in products, services, tools . . . product developments, materials, processes, methods.

You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

McGRAW-HILL PUBLICATIONS

A Big Draft Job Handled Capably by Green Fans

Twenty-four large Green Fans take care of a heavy draft load at the Venice (Illinois) Plant of the Union Electric Co. of Missouri. Each of six boilers has two sets of Green Fans, each set consisting of one induced draft fan and one forced draft fan coupled to one motor as a unit. With the heavy demands on this station, all boilers are usually in service continuously, thus throwing an unrelenting burden on the fans.

Engineers whose responsibility it is to recommend or accept draft fans for large power plants certainly want efficiency and low operating costs. But they don't overlook the maintenance and replacement angles. They want the sound designs of competent experienced fan engineers. They also want the care in construction that is found in shops of a company that has built up an international reputation as the "authority" on draft fans. They know that such a company will not tolerate sloppy shop work.

Green is this authority on mechanical draft fans.

Have You a Copy of Our Fan Bulletin No. 168? If not, we shall be glad to send you one.

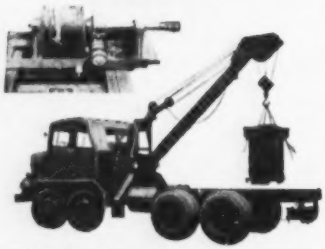
THE GREEN *Fuel Economizer* COMPANY INC.

BEACON 3, NEW YORK

ECONOMIZERS • FANS • AIR HEATERS • CINDERTRAPS

Utilities Have Specified
SILENT HOIST Equipment
• Since 1918 •

KRANE KAR Swing-Boom Mobile Crane: for materials-handling — lifting, transporting, positioning, gasoline or Diesel, 1½, 2½, 5 and 10 ton capacities, 9 to 37 ft. booms (or telescopic booms), solid or pneumatic tires. Self stabilizing without jacks or outriggers; unobstructed vision; fast, flexible, safe, easy to operate.



WINCHES: Capstans; Single and Double Drum, Jaw Clutch, Keyed and Friction Clutch Winches. 2,000 to 50,000 lb. Capacities.

SWING-BOOM CRANES: Truck: Motor Power Operated, high capacity; takes up only a small space. For handling transformers, cable reels, lamp posts, trees, poles, manhole castings, etc. 9 to 31 ft. booms; one to 10 ton capacities.

TOWERS: 2 or 3 section type and Pantograph types, with plain, revolving or racking platforms.

TRIPOD POLE DERRICKS for 35 ft., 45 ft., and 60 ft. Poles; single piece or telescopic side legs; removable cast steel fittings.

USERS: AT&T; N. Y. Tel. Co.; T.V.A.; Consolidated Edison Co.; W.U.; Municipalities throughout America.

WRITE FOR CATALOGS:
No. 79—*KRANE KAR* No. 70—*Truck Equipment*

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FREIGHT WHEELS, DRIVE AND REAR WHEEL STEER
U. S. AND IN TON CAPACITIES
IKRANE IKAR
TRADE MARK REG. U.S. PAT. OFF.
SILENT HOIST & CRANE CO.
882 63rd St., BROOKLYN 20, NEW YORK

17 St., Tulsa, consult. engrs. Lloyd Evans, c/o owner, engr.

Okla., Fort Sill—U. S. Eng., Box 61, Tulsa, Zone 2, cold storage plant and phone exchange, ENG 34-066-52-1, $500,000.

Okla., Yukon—City, bond election August 5, electric distr. sys. $125,000. C. H. Guernsey & Co., 2701 N. Oklahoma St., Oklahoma City, consult. engrs.

Texas—West Texas Rural Telephone Co-operative, Hereford, rural distr. lines, Deaf Smith Co. $557,000.

Tex., Dallas—Dallas Housing Auth., 2523 Lucas Dr., electric distr. sys. for housing, incl. street lighting, $75,000. Plans deposit $50. Associated West Dallas Housing Architects, 2523 Lucas Dr., engrs. and archts.

Ont., Guelph—Canadian General Electric Co., 212 King St., W. Toronto, factory, $500,000.

Low Bidders & Contracts Awarded

Calif., Davis—Bishop, Younger & Bradley, 405 Sansome St., San Francisco, Calif., CA, $679,311, AAG transmitter station, near here, Spec. 1624, U. S. Eng., Wright Bldg., Sacramento, Calif. Bids May 28, awarded July 10.

Calif., El Toro—Schurr & Finlay, Inc., 4961 Main St., Yorba Linda, Calif., LB $577,929, installing electrical distr. sys., (second increment) El Toro Marine Corps Air Station, NOY 72540, Spec. 33733, Dpt. Navy, San Diego, Calif. Bids July 15.

Fla., Wildwood—Royal Palm Ice Co., Wildwood, Fla., Owner Builds, $125,000, cold storage PLANT addns.

Ky., Paducah—F. H. McGraw & Co., 780 Windsor St., Hartford, Conn., CA, $459,000,000, addn. to uranium separation PLANT, U. S. Atomic Energy Comm., 1901 Constitution Ave., N. W., Wash. 25, D. C.

Me., Limestone—T. W. Cunningham, Inc., 38 Columbia St., Bangor, Me., LB $107,700, transmitter and receiver bldgs. at Limestone Air Force Base, ENG 19-016-52-78, U. S. Eng., 857 Commonwealth Ave., Boston, Mass. Bids July 18.

Mich., Adrian—Krieghoff Constr. Co., Adrian, Mich. CA Est. $175,000, 1 story, brick, concrete FACTORY, incl. electric furnaces, transformer sub-station, Alectra Metals Co., J. F. Irvin, pres., Adrain, Mich.

North Dakota—Ferranti Electric, Ltd., of New York, 30 Rockefeller Plaza, New York, N. Y., CA, $1,137,-605, supply 9 power transformers for Garrison Dam and Reservoir Proj. U. S. Eng., Fort Lincoln, P. O. Box 300, Bismarck, N. D. Bids Apr. 17.

Tenn., Oak Ridge—F. Maxon Const. Co., 131 N. Ludlow St., Dayton, O., CA, $464,000,000, atomic diffusion PLANT addn. U. S. Atomic Energy Comm., 1901 Constitution Ave., N. W. Wash. 25, D. C.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Calif., Los Angeles—University of California, 405 Hilgard Ave., 5 story, rein.-con. life sciences bldg. $1,500,000. Plans deposit $300. Marsh, Smith & Powell, 208 W. 8 St., archts.

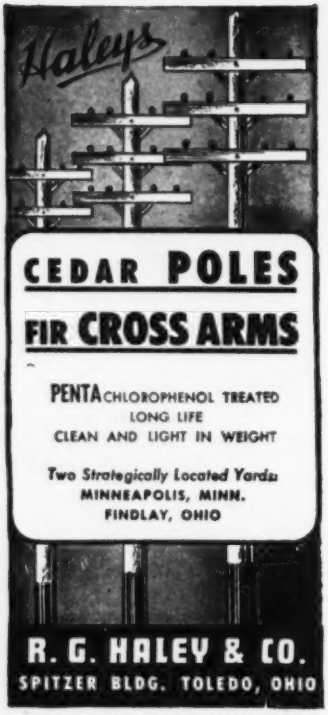
D. C., Wash.—Sibley Hospital, 1140 North Capitol St., plans by L. Justement, 2011 K St. N. W., 348-bed hospital and home for nurses, $9,382,000.

Ill., Norridge—Schoenbank & Kircher, 1515 W. Morse St., Chicago, plans by Sidney Morris & Assocs., 134 N. La Salle St., Chicago, Zone 2, shopping center on 20-acre, etc., Harlem Ave. and Forest Preserve Dr. $5,000,-000.

N. Y., Brooklyn—Bd. Educ., 49 Flatbush Ave. exten., Zone 1, plans by Kelly & Gruzen, 30 Fifth Ave., New York, Zone 3, Proj. E 646, Brooklyn High School, 35 Ave. tract at Rutland Rd., Kingston Ave. and Winthrop St. $8,000,000.

Va., Fredericksburg—Mary Washington College, Fredericksburg, dormitory, $950,000.

Ont., Ottawa—Dpt. P. Wks., Hunter Bldg., plans by E. A. Gardner, c/o owner, 100-bed military hospital, $2,-000,000.



drills 6 *inches of concrete per minute!*

...gives lowest cost per foot of concrete drilled with a TILDEN Rotary Konkrete Kore Drill. Two-thirds more cutting surface make Tilden 70% more efficient. Drills 5 to 7 times more holes without resharpening — even reinforced concrete. Free factory resharpening! Use with any electric or air drill. 29 standard sizes, 3/16" to 4". Interchangeable shanks up to 60".

TILDEN ROTARY KONKRETE KORE drill

Patented core slot expels cuttings *automatically!*

U. S. Pat. No. 2506474

WRITE TODAY for free, illustrated catalog.

SOLD BY SUPPLY HOUSES EVERYWHERE

TILDEN TOOL MANUFACTURING COMPANY
209 Los Molinos • San Clemente, California
Branch Office:
1144 W. Washington Blvd., Chicago 7, Illinois

FLINT

STEEL

FABRICATED - ERECTED from start to finish —

Flint can furnish your requirements for

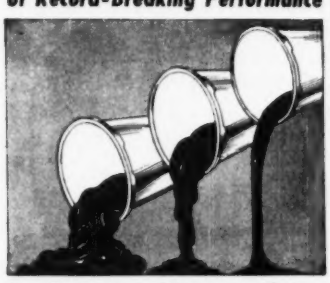
- STRUCTURAL
- REINFORCING
- GALVANIZED
- PLATE

FLINT STEEL CORPORATION
P. O. Box 1289
TULSA OKLAHOMA

Insulating and Cable-Pulling

COMPOUNDS

of Record-Breaking Performance



Mineralac gives you a complete assortment for every need: dense, viscous and fluid consistencies for high and low voltages in cable-joints, pot-heads, terminal bills, distribution cables, street lighting, telephone work. . . . Insoluble in oil or water, for all temperatures. Clean, safe, economical—outranks all others in quality.

Send for new literature and prices.

MINERALLAC ELECTRIC COMPANY
25 North Peoria Street—Chicago 7, Illinois

MINERALLAC

CATALOGS • BULLETINS

● BLIND LOCKBOLTS: The Huck Manufacturing Co, 2480 Bellevue Ave, Detroit 7, Mich has published an information page describing the use and application of their blind lockbolts. Information on this time saving device is included and copies are available to all engineers, Army, Navy, Marine and Air Force personnel upon request.

● TIERING TRUCKS: A new design presented by the Raymond Straddle Type Tiering Truck is described in a bulletin now being distributed by the Raymond Corp, 14491 Madison St, Greene, N. Y. The 2000 lbs capacity tiering truck which eliminates counter weight, tiers from 6 ft aisles and maneuvers easily on a 200° turning arc is completely explained and illustrated. Write the company for Bulletin 720.

● SAFETY RELIEF VALVE: Bulletin No 290 describes a completely new ASME approved safety relief valve Type F 51. This 4 pg 2 color bulletin contains photographs, graphs and charts on the new valve. Inquiries should be directed to the A W Cash Valve Mfg Corp, 666 E Wabash Ave, Decatur, Ill.

● SELF STICKING INDUSTRIAL PRODUCTS: The W H Brady Co, 1630 E Spring St, Chippewa Falls, Wisc, have published a new 80 pg full line product catalog including wire markers, pipe markers, safety signs, reflective signs, masks and stencils and printed roll tape. Copies may be obtained upon request to the company.

● INSTRUMENT DATA BOOK: Resistance bulbs and wells, radiation detector, special thermocouples for plastic injection and extrusion machines and molten metal thermocouple for ferrous metals are discussed in a new 42 pg bulletin just released. This 1952 catalog containing up to date prices, application recommendation and other information may be obtained from the Wheelco Instruments Div, Barber-Colman Co, Rockford, Ill.

● RECTIFIER WELDERS: A new 4 pg folder has just been published by the Taylor-Winfield Corp, Warren, Ohio describing Convair's new rectifier welders. It explains ten new three-phase machines with rectifiers which provide direct current for spot and seam welding on aircraft. For further information write the company.

● UNIVALVES: Complete material specification, detailed chemical analyses and physical characteristics are included in a new 8 pg catalog being issued by Edward Valves, Inc, 1200 West 145 St, East Chicago, Ind. It describes univalves integral seat all-purpose forged steel valves rated from 7,500 and 2,500 lbs and other features such as the impactor hand-wheel, streamlined straight-through flow passages, positive back-seat and leakproof bonnet are graphically illustrated. For copies write to Dept CU of the company.

● SINTERED MAGNETS: Catalog No 12, listing a range of sintered permanent magnets for relatively small devices is being issued by the Indiana Steel Products Co, Valparaiso, Ind. Specifications and descriptions of magnetic and physical characteristics of these powdered metal magnets are included.

● STEEL VALVES: A new catalog showing their Univalve integral seat all-purpose valves has been issued by Department CW, Edwards Valves Inc, 1200 West 145th St, East Chicago, Ind. The catalog contains data on dimensions, weights, pressure-temperature ratings and construction features.

● BIMETAL: A new booklet entitled "Successful Application of Chace Thermo-

KLEIN

Quality you can count on—FOR SAFETY... FOR SERVICE

Yes, safety and service are the two big reasons why Kleins are the choice of the man on the pole. Look for the familiar Klein trade-mark on pliers and climbers, safety straps and belts, lag wrenches and grips. It has been a trade-mark of quality "Since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Write for your free copy of the Klein Pocket Tool Guide today!

"Since 1857"

Mathias Established 1857 KLEIN & Sons Chicago, Ill. U.S.A.
3200 BELMONT AVE. CHICAGO 18 ILL.

Quick and Easy to Install

G-E Standard Meter Sockets

- With quick-hitch sealing ring
- For all applications
- Corrosion resistant; long life

Contact your nearest G-E sales office. General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

Double Barrel Advertising

Advertising men agree—to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

Display Advertising keeps your name before the public and builds prestige.

Direct Mail supplements your Display Advertising. It pin-points your message right to the executive you want to reach—the person who buys or influences the purchases.

More and more companies are constantly increasing their use of Direct Mail because it does a job that no other form of advertising will do.

McGraw-Hill has a special Direct Mail Service that permits the use of McGraw-Hill lists for mailings. Our names give complete coverage in all the industries served by McGraw-Hill publications—gives your message the undivided personal attention of the top-notch executives in the industrial firms. They put you in direct touch with the men who make policy decisions.

In view of present day difficulties in maintaining your own mailing lists, our efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

McGraw-Hill Publishing Co., Inc.
330 West 42nd Street, New York 36, N. Y.

static Bimetal" is available from Chace Co, 1654 Beard Ave, Detroit 9, Mich. This fully illustrated catalog explains the various uses of bimetal in temperature responsive devices. Copies may be obtained from the company.

● RF EQUIPMENT: The Daven Co of Newark, N. J., has prepared a pamphlet covering their rf and video equipment available to the industry. It covers all the types of radio frequency and video attenuators they manufacture and includes impedances, diagrams, pictures and specifications.

● FIXED RESISTORS: Their fixed composition resistors are described in a bulletin now available from Stackpole Carbon Co, St Marys, Pa. The bulletin is designed as a convenient guide and includes prices on the various fixed composition resistor types.

● OSCILLOGRAPH CAMERAS: Dumont Laboratories, Inc, 1500 Main Ave, Clifton, N J, have available descriptive bulletins of their oscillograph-record cameras for various CRO applications. Copies may be obtained by writing the company.

● CUTTING TOOLS: The Manco Mfg Co, of Bradley, Ill, has released a new catalog on their line of portable cutting tools, ranging from hand cutters to bolt cutters. Photographs and complete information accompany each model described in this 2 color 4 pg brochure.

● PLATING RECTIFIER: Catalog sheets have been issued by Wesley Block & Co, 39-15 Main St, Flushing, N Y, describing their self contained rectifier for electroplating processes. Copies of their 8 pg, 2 color bulletin are now available from the company.

● CELLULAR GLASS: A new 4 pg folder discussing the use of Foamglass in sandwich panel construction is available from Pittsburgh Corning Corp, 307 Fourth Ave, Pittsburgh 22, Pa. This literature explains the use of foamglass in various types of building, textile, food production, and electric power.

● APPARATUS DIGEST: Catalog 50-000, can now be obtained from the Westinghouse Electric Corp, 401 Liberty Ave, Pittsburgh 30, Pa. This 100 pg booklet for distribution apparatus, plus conversion tables and approximate discounts will be sent upon request.

● CABLE INSULATIONS: A new brochure entitled "Kabelitems" released by the Bakelite Corp, 30 East 42 St, New York 17, N Y, describes new plastic insulations for electrical wires and cables. Write the company for copies of this bulletin.

● TV SERVICE BOOK: Available as a bonus with tube orders, RCA is offering volume I, II or III of their television Pict-O-Guide, as well as "TV Servicing Supplement" for more difficult service problems. Wider in scope than earlier volumes the pocket size leatherette booklet contains more than 200 pgs of detailed service information and photographs. Write RCA Victor News, Press Division, Camden, N. J.

● INDUSTRIAL RECORDERS: A new catalog describing direct-writing multichannel recorders for industrial usage is being distributed by the Sanborn Co, Cambridge 39, Mass. Recording problems such as temperature, pressure stress, strain, vibration, RPM, and displacement are fully discussed. Copies are available.

● AERO TEST STAND: A bulletin, obtainable from U S Electrical Motors Inc, 200 E Slauson Ave, Los Angeles 54, Calif, describes the uses of their variable speed test-stands, which range from ¼-70 hp and up to 15,000 rpm. Graphs show comparison of variable speed systems, load ratings and relative speeds.

TECHNICAL LITERATURE

Machinery Parts—A wide variety of cast and wrought alloy parts now being used in many industries to solve abrasion, corrosion and high temperature problems are described in a recently issued 24-page booklet, *Long-Wearing Machinery Parts*. It is available from the Haynes Stellite Co, Div of Union Carbide and Carbon Corp, 30 E 42nd St, New York 17, N. Y.

Uranium—A revised edition of the popular pocket sized handbook for uranium prospectors *Prospecting for Uranium*, is available from the Superintendent of Documents, U S Government Printing Office. The booklet published jointly by the AEC and the U S Geological Survey has the latest AEC price circulars and eight color reproduction of common uranium bearing ores. The price is 45¢ per copy.

Generators—How descrepancies in generator output voltage are corrected by a series of amplifying stages in Regulex regulators is described in a new article recently issued. It may be obtained from the Allis-Chalmers Mfg Co, 922 S 70 St, Milwaukee, Wisc. Request article *Final Stages to Stability*, 05R7776.

Air-Operated Combustion Control—A detailed account of tried and proven automatic combustion control techniques for oil and gas fired boilers is now available in a 24-pg tri-colored brochure, No 1023. Comprehensive illustrations and descriptions are included along with individual facts and figures on 300 nationwide installations. Write the Bailey Meter Co, 1050 Ivanhoe Rd, Cleveland 10, Ohio for further information.

Summer Cooling—A new 24 pg 2 color illustrated booklet containing factual and helpful information on how to "beat the heat" has been issued, entitled *"How To Keep Your Home Cooler In Hot Weather."* It deals not only with the utilization and benefits of mechanical cooling devices, but discusses many other aids for summer cooling. It is available free from Vornado dealers or the O. A. Sutton Corp, 1812 West Second St, Wichita, Kansas.

Optical Gaging—A new publication which describes recent developments in optical gaging is now being distributed by the Eastman Kodak Co, Rochester 4, N. Y. It includes descriptions of elements of an optical gage, charts used in inspection gaging fixture principles and desirable characteristics in an optical gaging projector. Copies may be obtained without charge from the Industrial Optical Sales Div of the company.

Air Conditioning, Cleaning and Handling—A 60 pg 2 color catalog of products for "putting air to work" is now available from the Westinghouse Electric Corp, Sturtevant Div, 200 Readville St, Hyde Park, Boston 36, Mass. It is divided into three sections, an application section, equipment section and an engineering data section. Copies of Catalog 600 are available upon request.

Nema Standards—The booklet *"Protective Maintenance of Motors and Generators"* published by NEMA, in its third printing sold in single copies at 50¢ is being offered at quantity prices exclusive of shipping charges as follows: 10-99 copies, 25¢ each, 100-499—copies 20¢ each over 500 copies 15¢ each. Address requests to Renewal Parts Section, National Electrical Manufacturers Assoc, 155 East 44 St, New York 17, N. Y.

Measurement Units and Standards—*"Electricity,"* the third booklet in the series *"Units and Standards of Measurement Employed at the National Physical Laboratory"* is now available. It deals with current, voltage resistance, power, energy, inductance capacitance and fre-

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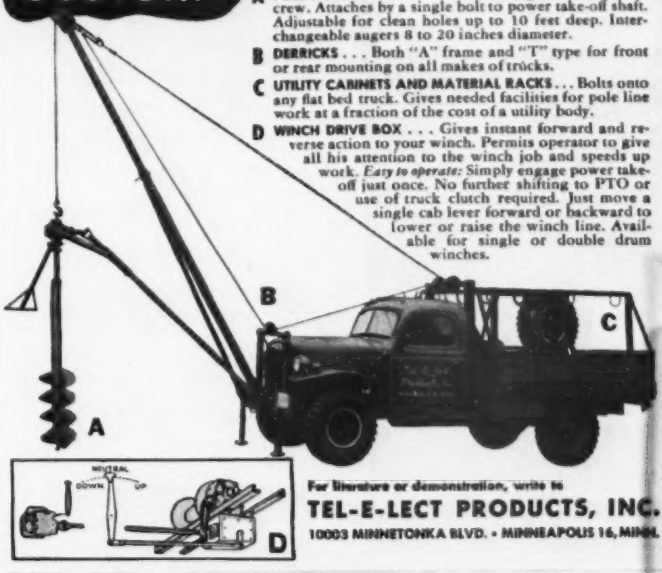

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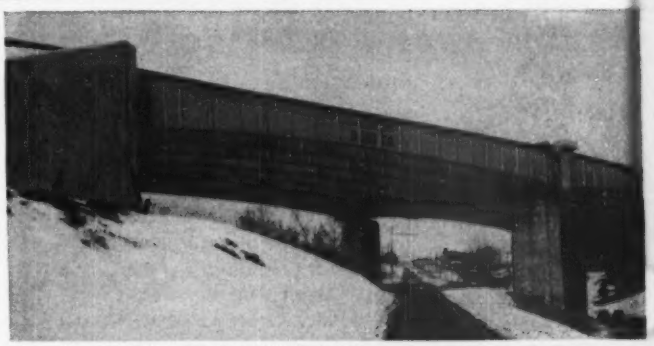

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quency. It is published by the National Physical Laboratory, Teddington, Middlesex, England at 25¢ per copy.

Precision Measurements—The principle of operation of hand, portable and fixed installation tachometers is explained in a new piece of literature being issued by the Metron Instrument Co, 432 Lincoln St, Denver 9, Colo. It contains circuit diagrams and pictures and copies may be obtained upon request.

AIEE Standards—The following standards have been released by the American Institute of Electrical Engineers 33 W 39th St, New York 18, N. Y.: 18 (C55.1)—on Capacitor Units, C 57.12 a on Transformers, 67,000 volts and below and 950, Recommended practice for Measurement of field intensity above 300 MC from Radio Frequency Industrial, Scientific and Medical Equipments. Inquiries should be sent to J J Anderson, Secy of the Standards Committee.

Instrument Amplifier—The accuracy of oscilloscopes and vacuum tube voltmeters is greatly increased by an improved instrument amplifier described in a new 4 pg booklet. Designated as Model 102 Phantom Repeater it has an input impendance of over 200 megohms shunted by 6.0 mmf; gains 1.0, 10 and 100; frequency response from 5 to over 15,000 cps. Write Keithley Instruments 3868 Carnegie Ave, Cleveland 15, Ohio.

Electrical Reference Book—The second addition of Lincoln's Industrial-Commercial Electrical reference is now being distributed. It contains 1760 pgs, 500 tables, 400 diagrams, and 1400 illustrations, the entire N E C code and every appropriate Nema Standard. For information about this book write The Electrical Modernization Bureau, Inc, 110 Mamaroneck Ave, White Plains, N. Y.

Welding—Reprints of "Preheating for Welding" by Arthur B Tesmen which appeared in the April Welding Journal are now being made available by the Templi Corp, 11 West 25th St, New York 11, N. Y. The paper reviews welding procedures which have been found by experience to produce crack free welding joints under a wide variety of conditions. Write for copies on business stationary.

Steel Piping Materials—The 1952 edition, sponsored by ASTM Committee A-1 on steel, containing in their approved form, the 56 widely used ASTM specifications for carbon steel and alloy steel pipe and tubing including stainless, is now available. Write the American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.

Receiver Tubes—A new enlarged third edition of the *Television Receiver Tube Complement Book* has been announced as available by the Radio Tube Div, Sylvania Electric Products Inc, Emporium, Pa. It lists receiving and picture tubes required for nearly 4000 different models of TV sets and is cross indexed to associate trade names with manufacturers names in order to save TV servicemen time, when making calls. Copies of the book may be obtained through the company's distributors or its advertising dept at 75¢ each.

Gears—A new paper which clarifies the data required to specify and test spur and helical gears is offered in *"A Practical Approach to Gear Quality"* published by the Eastman Kodak Co, Rochester 4, N. Y. It includes specifications, a definition of "class" and a discussion of backlash, the analytical errors and active vensus inactive profiles. Copies may be obtained from the company's Industrial Optical Sales Division.

Corrosion Resistance—A new 4 pg information sheet entitled *"High Corrosion Resistance Gives Nickel Plated Metals Wide Range of Uses"* has been made available by the International Nickel Co, Inc, 67 Wall St, New York 5, N. Y. It points out that nickel plating can often be the

economical answer where service conditions do not justify use of solid corrosion resistant materials, because of nickel's good corrosion resistance to a wide variety of products. Further information may be obtained from the company.

Connectors—A new leatherette bound booklet describing the use of connectors for aluminum conductors in overhead distribution has just been issued by the Burndy Engineering Co Inc, 107 Bruckner Blvd, New York 54, N. Y. Inquiries about the folder should be made to the above address or to a Burndy representative found in all major cities.

Television—*"UHF—What it Means to Television and to You"* is the name of a new 24 pg information booklet published by the Radio Corp of America, RCA Bldg, 30 Rockefeller Plaza, New York 20, N. Y. A review of the years of pioneering, research and engineering that preceded the lift the television station "freeze" is included. Inquiries should be made to the Dept of Information of RCA.

Lighting—An information booklet has recently been issued by the J A Wilson Lighting & Display Inc, 995 Main St, Buffalo 3, N. Y. describing a new product Wire-Tile. The brochure explains the use of this new tile in terms of illumination efficiency cost and maintenance viewpoint. Copies are available from the company.

Foundry Mechanization—The contrast between original methods and modern mechanical handling in molding, pouring, cooling and sand preparation is shown in a recently issued release, No 2439. Increased production, better castings and improved working conditions is also discussed in this booklet published by the Link-Belt Co 307 N Michigan Ave, Chicago, Ill.

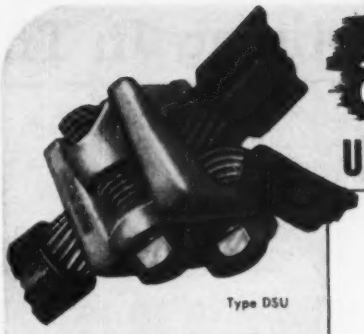
Water Conditioning—An enlarged edition of the Permutit Data Book, brought up to date, completely revised and containing 77 tables is now available. Hydraulics, impurities in water, chemical conversions, saturated steam and alkalinity relationships are but a few of the subjects covered. This leatherette bound volume is available to engineers working on water conditioning problems from the Permutit Co, 330 West 42 St, New York 36, N. Y.

Instrumentation—*"The Fundamentals of Instrumentation for the Industries"* is the title of booklet 88-2 consisting of 126 pages. It covers fundamentals of measurement and control and transmission of variables encountered in industry plus applications. It may be obtained from the Minneapolis-Honeywell Co Wayne & Windrim Aves, Philadelphia 44, Pa.

Electrical Maintenance—A new 24 pg manual describing complete maintenance service for electrical apparatus has recently been distributed by Westinghouse Electric Corp, Box 2099, Pittsburgh, Pa. It contains a sound program based on the use of genuine renewal parts, repair service plants and engineering and field service. Photographs are included. Copies are available.

Thermohms—The entire line of general purpose Thermohms (resistance thermometers) are fully described and illustrated in a new 86 pg catalog and buyers guide just published. Entitled *"Thermohms, Assemblies, Parts and Accessories,"* it can be obtained from the Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 44, Pa.

Copper and Copper Alloys—The latest edition of the ASTM standards pertaining to copy and copper base alloy products, developed by Committee B-5 on copper and copper alloys, cast and wrought has just been released. This $5.40 cloth cover or $4.75 paper cover book containing 520 pages and 114 specifications and test methods may be obtained from the American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa.



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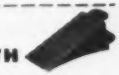

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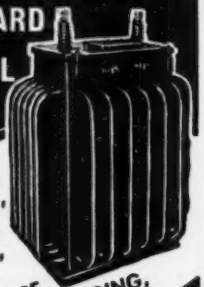

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850	Westgh.	3	4160	455
450	G.E.	3	2300/4000	230/460
300	G.E.	3	13800	240/480
300	G.E.	3	2400	240/480
200	Wagner	1	2400	575
167	A.C.	1	2400	120/240
150	Phlte.	1	2400	575
100	A.C.	1	2400	120/240

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H.P.	Make	Type	Speed
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500	*G.E.	PBG	1800
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400	*Cont.	NZ	1800
400	*G.E.	IK	514
350	*Cr.-Wh	SC	3600
300	G.E.	IE-K	1200
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DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3765) will be received at Denver, Colorado, until August 26, 1952, for furnishing three 230-kv (900-kv basic impulse insulation level), 3-pole, 1,200-ampere, 7,500,000-kva, outdoor power circuit breakers for Folsom Switchyard, Central Valley Project, California. Delivery is desired within 480 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3760) will be received at Denver, Colorado, until September 4, 1952, for furnishing three 60-cycle, 3-winding, single-phase, class OA/FA, outdoor power transformers, each rated 10,000/13,333 kva at 88,915/154,000 volts, 10,000/13,333 kva at 19,920/34,500 volts, and 2,500/4,667 kva at 4,000 volts; with automatic tap-changing-under-load equipment; and with additional equipment required for parallel operation with another bank of power transformers for Gila Substation, Davis Dam Project, Arizona-Nevada. Delivery is desired within 720 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3761) will be received at Denver, Colorado, until September 4, 1952, for furnishing one 10,500-kvar, outdoor power capacitor equipment, suitable for use on a 69,000-volt, 3-phase circuit, consisting of individual capacitor units, supporting structure, switches, buses, potential transformer, discharge devices, and lightning arrestors for Cochise substation, Davis Dam Project, Arizona-Nevada. Delivery is desired within 270 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFR.	VOLTAGE
4	500	Pitts.	66000-33000-13200/23000 Y
3	333	G. E.	66000-2400/7200
3	200	Pitts.	66000-2300
3	75	A. C.	66000-24000-7200/12470 Y
3	200	West.	45000-2400/7200
3	150	G. E.	44000-7200/12470 Y
3	100	G. E.	44000-2300
3	75	West.	44000-7200/12470 Y
3	8333	West.	43500-13800
3	5000	G. E.	38100/66000-6600
1	18750	A.B.B.	34840-11000, 3 ph.
2	900	G. E.	33000-2300, 3 ph.
6	200	A. C.	34500-6900/11950
4	200	G. E.	34500-230/460
3	100	West.	33000-240/480 NEW
3	100	A. C.	33000-7200/12470 Y
3	75	Wag.	33000-7200/12470 Y
4	450	A. C.	25410/44000-13250/23000
6	100	G. E.	22000-7200/12470 Y
9	50	G. E.	22000-2300
3	37½	G. E.	22000-6900
6	200	G. E.	13200-2300
3	200	G. E.	13200-230/460
4	750	G. E.	11000-440
3	250	Pitts.	7200-230/44
3	150	Wag.	6900-2300
3	37½	G. E.	6900-230/460
2	100	G. E.	4800/2400-480/240
3	1500	A. C.	2300/4000 Y-2300
3	333	G. E.	2300-230/460
1	100	G. E.	2300-575, 3 ph.
3	100	West.	2300-460/230
6	50	West.	2400-114/228 DRY TYPE
3	20	West.	2200-575

INDUCT. REGULATORS—OUTDOOR

1— 140 KVA G. E. 200 A. 4000 V. 3 ph.
4— 60 KVA West. 250/500 A. 2400 V. 1 ph.
6— 48 KVA G. E. 200 A. 2400 V. 1 ph.
8— 36 KVA West. 150/300 A. 2400 V. 1 ph.
2— 36 KVA G. E. 75/150 A. 4800 V. 1 ph.

CIRCUIT BREAKERS

1— 600 A. 73 KV G. E. FHKO 236-500 MVA
1— 600 A. 37 KV G. E. FHKO-236-500 MVA
1—1200 A. 15 KV G. E. FKg-139-350 MVA
1— 600 A. 15 KV G. E. FKO-139-350 MVA
1— 600 A. 15 KV G. E. FHKO-136-1328-Bst
4— 600 A. 15 KV G. E. FHKO-139-750 MVA
1— 400 A. 15 KV G. E. FHKO-136-350 MVA

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1100	General Motors	16-278A	1600	720	300	General Motors	8-268A	450	1200
750	General Motors	12-567	1060	720	200	General Motors	6-268A	350	900
600	General Motors	8-278A	760	720	100	General Motors	3-268A	150	1200
400	General Motors	6-567	720	720	100	Worthington	BB-5	150	900
330	Baldwin	VO-6	510	450	60	General Motors	6-71	90	1200
320	Buckeye	80	480	900	30	Internat'l Harvester	UD-14	45	1300

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Qu	KW	Make	Desc.
1	—6000	Al. Ch.	Condensing 200/250 I.S.P. 2300 v 3/60 Exc & Surf cc Cond.
1	—750	G.E.	Condensing — 425 lbs. 750 TT I.S.P. 440 v 3 ph. 60 cy.— Built 1944
1	—500	Moore	Non-condensing. 150/200 lbs. I.S.P. 5/35 lbs. G.B.P. 3/60/480 volt Direct Connected Exciter
1	—400	Westg.	Non-condensing — 125/150 lbs. I.S.P. 5/10 lbs. B.P.— 240/480 v. 3 ph. 60 cy.
1	—300	G.E.	Non-condensing 150/175 I.S.P. 5/10 B.P.— 480 v. 3 ph. 60 cy.

SYNCHRONOUS CONDENSERS

KVA	Make	Type	Volts	Speed
1—5000	Whse.		2400/4150	600

MOTOR GENERATOR SETS

3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	AC Volts
1—	2000	G.E.	514	600	6600/13200
2—	2000	G.E.	500	666.25 cy.	11000
1—	1500	G.E.	720	600	13200
1—	1500	G.E.	300	275	2200-4400
3—	1500	G.E.	514	250	6600/13200
1—	1000	G.E.	900	260	4100/6900
1—	1000	G.E.	600	600	2300/4150
2—	1000	Whse.	900	600	2300/4158
1—	500	Whse.	900	250	6600/13200
1—	500	Whse.	1200	125/250	2300
1—	500	Whse.	900	250	440
1—	500	G.E.	720	125	2300
1—	400	G.E.	720	250	440-2300
1—	350	G.E.	900	125	4150
1—	150	G.E.	1200	275	2300
1—	150	Whse.	1200	275	2300

TRANSFORMERS—60 Cycle

	KVA	Make	Type	Ph	Voltages
2—	1250	G.E.	HVDDJ		6600x550
1—	1150	A.C.	OISC		13200x480/2400
3—	1000	G.E.	HVDDJ	1	2200x480
9—	300	G.E.	HT	3	24000x240/480

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1—1500 KVA Pwnt. 3 ph., 4150V. Y 2400V Delta
2— 400 KVA Pitts., 1 Ph., 2400/4800V prl. 240/480V sec.
1— 200 KVA G.E., 3 Ph., 2400-220 Sec.
3— 100 KVA Wagner, 1 Ph., 2400V prl., 120V sec.
6— 50 KVA G.E., 1 Ph., 13,450V. 120/240 Sec.

SYNCHRONOUS MOTORS

1— 300 H.P., Elec. Mach. 720 RPM. 3 Phase 60 cyc., 2200V T E F Cooled Outdoor service.
1— 150 H.P., G.E., 1800 RPM., 220V.
3— 150 H.P., Al. Chal. 300 RPM., 440V.

MOTOR GENERATOR SETS

1—1000 KW G.E., 600 V. 514 RPM., 6600V 3ø.
1— 200 KW Whse., 275V. 900 R.P.M., 220 V 3ph.
1— 175 KVA Westi., 1 Ph., 220V Motor 3 Ph., 440V.
1— 150 KW. G.E., 120/240V, 1200 RPM., 2300 3ph
1— 100 KW G.E., 250V, 900 RPM, 2300V. 3ph.
1— 75 KW C.W. 250V, 1200 RPM, 2300/3150V 3ph.

SLIP RING MOTORS

1— 200 H.P., West. CW., 600 RPM., 440V.
1— 250 HP West., CW. 600 RPM., 440V.

SYNCHRONOUS CONDENSER

1—600 H.P. West. CW, 600 RPM, 440V.
1—2500 KVA Whse., 720 RPM. 2300V with DC EXC.

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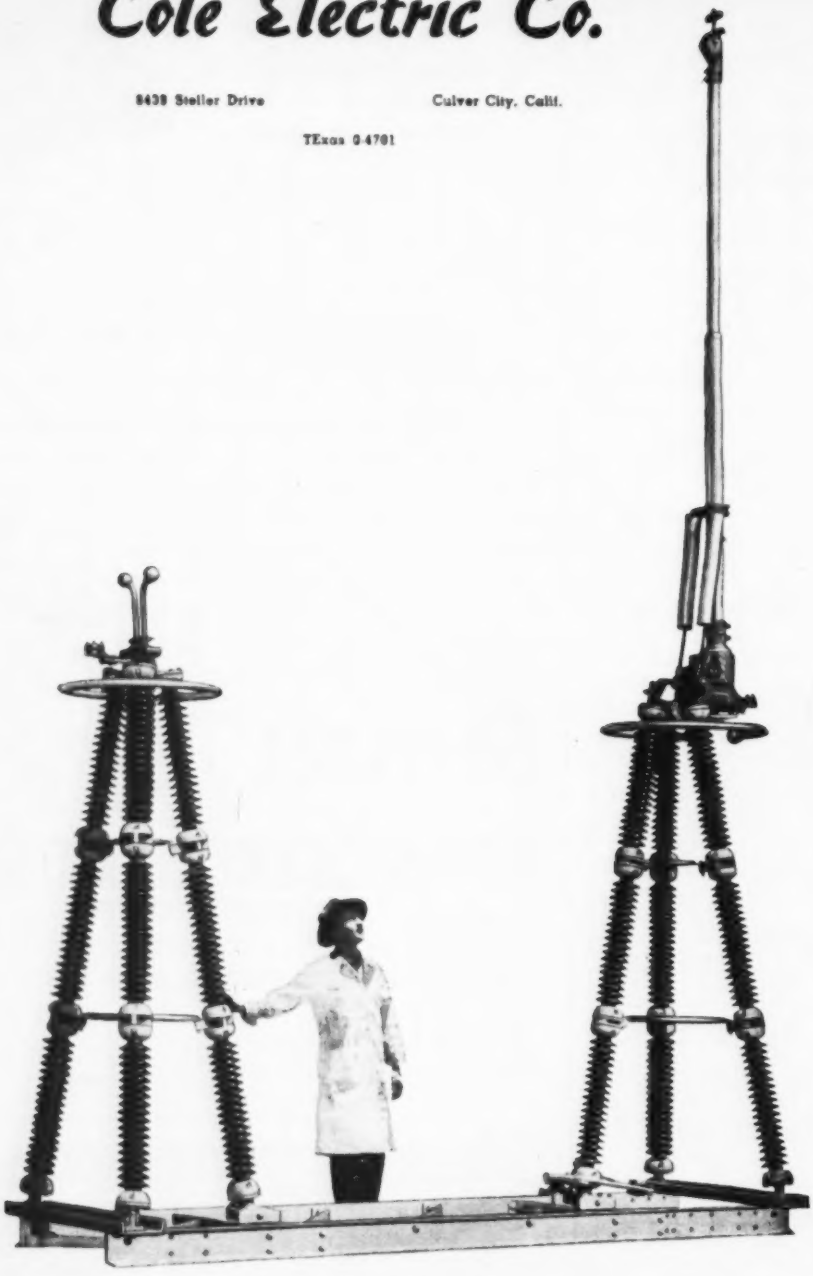

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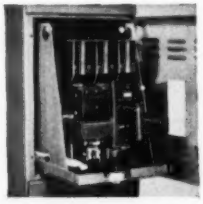
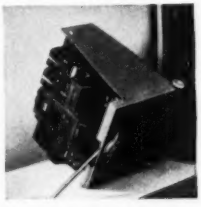
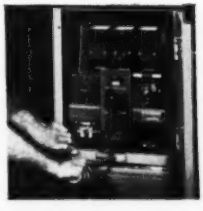


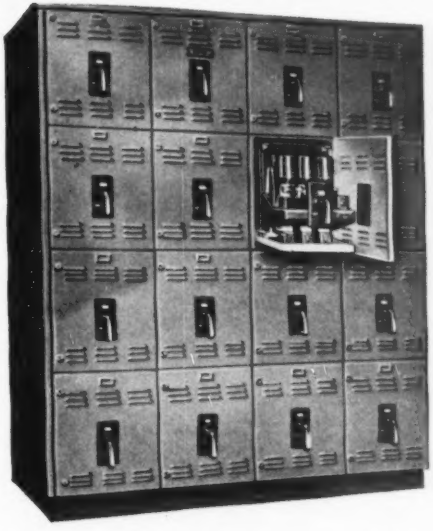
1—Breaker element of Drawout Switchgear on its self-supporting chassis.



2—Side view showing rollers and bottom mechanism that forces movable contacts into the stationary contacts.



3—Breaker elements are levered in and out of the "latched in" position by a rotary lever arrangement.



YOU'LL SAVE space, time and expense...and always assure accurate alignment and performance with Federal Noark Drawout Switchgear. These compact, factory-assembled units have every design feature that makes for safe, dependable operation and maximum life.

In the Federal Noark Drawout Switchgear the breaker elements consist of a self-supporting chassis with rollers that travel in compartment channels. A special triangle shift principle accurately aligns the contacts as they approach the "latch in" or "operating" positions. For safe and positive operation, a mechanical interlock permits breaker to be closed only when latched into the "all in," "test" and "all out" positions. Both the stationary and movable contacts are heavily silverplated, and the movable contacts are spring reinforced for extremely high efficiency.

Drawout Switchgear breaker elements are levered in and out of the "latched in" position by a special built-in rotary lever arrangement. Operating lever is a straight rod type. No wrenches or other tools are needed.

For any specific application, write for full information on the Federal Noark Drawout Switchgear.

Federal Electric Products Company, 50 Paris St., Newark 5, New Jersey.

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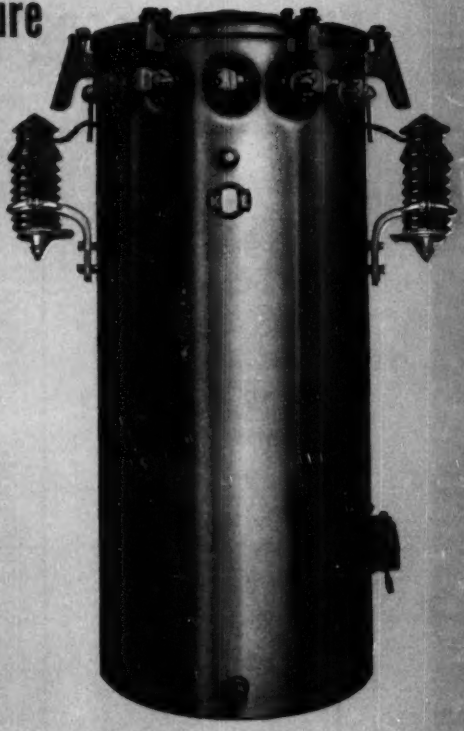
TRANSFORMER OPERATORS' QUIZ:

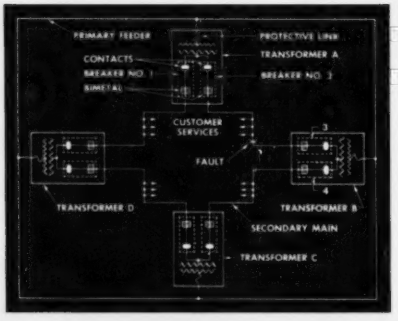
How do KUHLMAN CSPB® transformers protect equipment and assure uninterrupted service?



In high load areas, distribution transformers are often banked with both primaries and secondaries connected in a closed loop with "built in" circuit breakers. This arrangement provides two main advantages. It protects equipment against excessive surge voltages and the concentrations of power at fault points; and it assures uninterrupted customer service by permitting transformers in the bank to "gang up" to supply power to any point where there is an increased demand.

You get these advantages when you use Kuhlman CSPB banked transformers: (1) rapid fault location with a minimum load loss and service interruption, (2) reduced voltage drop due to low effective impedance of paralleled transformers, (3) reduced flicker caused by suddenly applied loads, (4) short-time overloads carried safely, because of the thermal loading provided by secondary breakers, (5) isolation of faulty transformers by primary protective link and secondary breaker, and (6) all protective devices included in one single installation, eliminating crossarm accessories.

Here's how it works . . .



Assuming a fault occurs at X in the diagram, the Kuhlman CSPB transformer bank operates as follows:

1. The fault draws current from the transformers in inverse proportion to the total impedance of each transformer.

2. Transformers A and B, being adjacent to the fault, supply the bulk of the fault current. This current combines with the fault current from transformers C and D, flowing through the bimetals of breakers 2 and 3.

3. At the same time, the fault currents from C and D oppose the load currents in breakers 1 and 4, causing breakers 2 and 3 to open and isolate the faulted section.

4. With the faulted section isolated, transformers A and B will continue to furnish their former share of the load through breakers 1 and 4 to the remaining network.

5. A red signal automatically lights on the transformer connected to the faulted circuit, in this case transformer B.

Kuhlman **ELECTRIC COMPANY, BAY CITY, MICHIGAN**

Write for descriptive bulletins on Kuhlman Power, Distribution, Dry Type, Sal-T-Kuhl, and specialty units. For details of CSPB transformers, ask for Bulletin CS-302.

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,* **67 Broad Street, New York 4, N.Y. Cable address: Microphone, N.Y.**